

Dr Nicholas Hellmuth

Mid-Range UV Combo Printer



Dilli Neo-Venus 2506

Contents



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THE BASIC

1. Brand name, model?

Dilli NEOVENUS UVV-2506(GW) and Dilli Neo-Venus are two designations for the same chassis and print engine. One has the newer features, but otherwise they are basically the same.

I prefer to write the product name “Neo Venus” without caps and with no hyphen; it is more legible this way. As one word it’s confusing, and is not easy to distinguish from the Neo Plus and other Neo-series UV printers.

Designations for models tend to be written in various alternative ways, depending on whether it’s in the title of the manual, or in the sales brochure. And model names change when new printheads are used, or when white is added. Our evaluation covers the basic chassis and print engine, so essentially we cover the entire range of versions of the Neo Plus that may appear in brochures.

2. What is the nature of the company? Is this company the manufacturer, distributor, or rebranding a machine made by someone else?

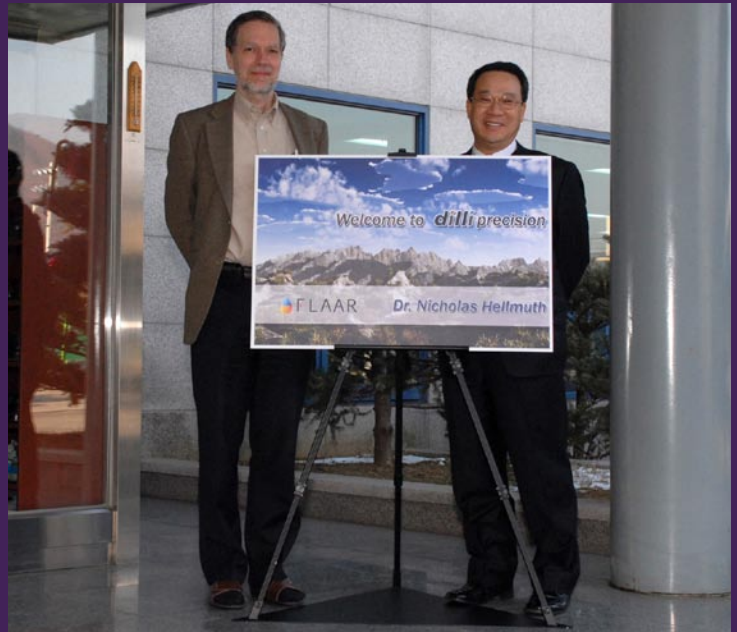
Dilli Precision designs and manufacturers their own printers. I have spent several days in their R&D institute, in their factory, and visiting other parts of their world headquarters north of Seoul.

Dilli is associated with D.G.I., which also has a research institute related to wide-format inkjet printing. Each company is owned by a brother. The research institute of D.G.I. is definitely impressive. There was so much to see that I don’t have a single photograph. Room after room of sophisticated testing and research equipment dedicated to wide-format inkjet printers, as well as to industrial inkjet printing (jetting materials other than ink).

Overall I saw more R&D equipment at these two Korean companies than at other companies that I have visited. Nowhere in China have I seen even close to this much dedicated to testing the parts that go into their UV-curing wide-format printers.



Dilli Neo Venus printer



Dilli has

- 2,768 m² assembly space,
- 231 m² R&D space ,
- 165 m² for sales and marketing

Total square meters of the entire building, all floors, including assembly, R&D, and sales & marketing space

- At the address of 542-2 :: (6,424 m²)
- At the address of 542-3 :: (4,958 m²)

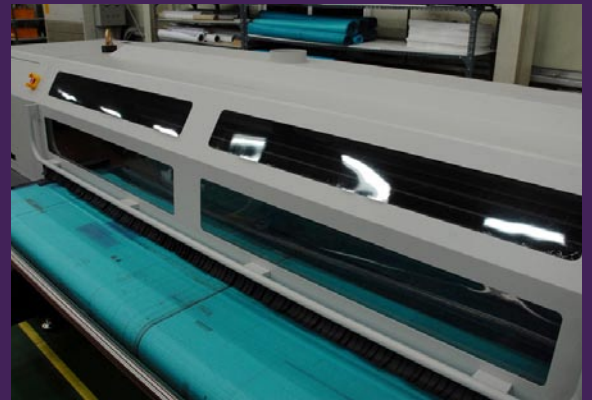
Dill presently has > 25 workers working on the assembly line but there are plenty of capable new people in the area that could be hired to increase manufacturing capability.



Dilli Neo Plus UV
Combo Printer

Dilli has > 12 research workers in R&D.
> 6 Sales Representatives work in marketing & sales
(keep in mind presently probably 75% of their production is OEMed, so the company for which they OEM has their own worldwide

> 27 workers are elsewhere in the Dilli company.



I spent several days in their factory, have visited their R&D facilities and seen their sales and marketing areas.



Dilli Neo Venus UV
Combo Printer

3. What other printers are the same or similar chassis from this manufacturer or distributor?

The Dilli Neo Plus looks very similar with Neo Venus in internal chassis and print engine, but have a different printhead. The Dilli Neo Venus has a Spectra Galaxy 256 head with 30 picoliters.

4. Is this same model(s) rebranded and sold under other names?

Dilli has supplied some portion of Neo Venus under other name on OEM basis.

5. How does this model compare with comparable previous printers?

This printer has several improvements over the Neo Plus: better definition and better overall print quality from a printhead with smaller picoliter drop size. But if you want to print billboards or banners, a larger drop size (of the Dilli Neo Plus) is an advantage.

6. Is this printer mature or still in alpha-stage or beta-stage?

This printer is ready for shipping.

7. List price?

Dilli Neo Plus is \$220,000.

Dilli Neo Venus is 230,000

8. What other equipment is needed to operate this printer? For example, does this printer include its own power line conditioner? Do you need an uninterruptible power supply (UPS)? Do you need to provide air pressure for negative pressure for ink in printheads?

Yes, you need to provide oil-free compressed air yourself (to maintain negative pressure in the printheads).

9. Is it recommended, or required, to buy a spare parts kit? Or extra printheads?

It is not required to buy a spare parts kit; your dealer is supposed to have all this.

10. Or do the dealers prefer that customers not try to make their own repairs?

The end-user is not encouraged to take the printer apart and do repairs on their own.

This policy varies by manufacturer. Interest in doing their own repairs varies by the end-user and by the printer operator. A few operators like the opportunity to take service training at the factory and thereby to be able to do basic repairs on their own. Most manufacturers discourage this, but some manufacturers do allow end-users to take advanced service training.

PURCHASING

11. Are dealers national (most companies) or regional (Roland allows a dealer to operate only within a limited regional area)? Does a buyer have any choice in dealers?

Dealers/distributors tend to be national in countries in Europe. But in the US there are at least five regional distributors. ACCI is the one I know the best.

FEATURES OF THE PRINTER: Vacuum

12. Is there a vacuum function?

Yes, there is a vacuum function generated with two vacuum pumps. Each pump has two hoses so there are four sections.

13. Can you turn one or the other section(s) off and on?

Yes, you can turn one section on and another off.

14. Just Off and On? Or variable?

Just Off and On.

15. Are the vacuum areas (size and position) user definable?

No.

STRUCTURE OF THE PRINTER: Media Transport Mechanism & Media Path

16. Was this printer made originally as a UV-curable ink printer, or is it retrofitted with UV-curing? If retrofitted, what was the original brand or model?

Dilli makes only UV-cured flatbed printers.

Retrofitted solvent printers tend to be less cost since the UV version uses a chassis and other features that were already available from the solvent version. But a brand new UV printer, designed for UV ink chemistry from the ground up, may be more reliable in the long run.

Most Chinese UV printers are retrofitted solvent printers, such as those from Infiniti and Flora. These have had endless issues (even the original solvent versions with solvent ink). Even their printers that were combo, and not hybrids, were the DuPont printers. Not even DuPont could make them work satisfactorily.

17. Is there a moving transport belt (combo style) or a stationary platen (hybrid style)?

Three of the Dilli printers have a combo style transport belt: Neo Titan, Neo Plus, and Neo Venus. One Dilli printer is a dedicated flatbed: Neo Deluxe. There is no hybrid style printer from Dilli, nor from IP&I either.



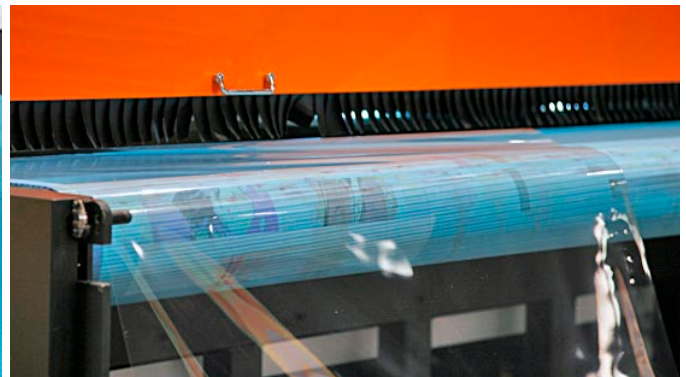
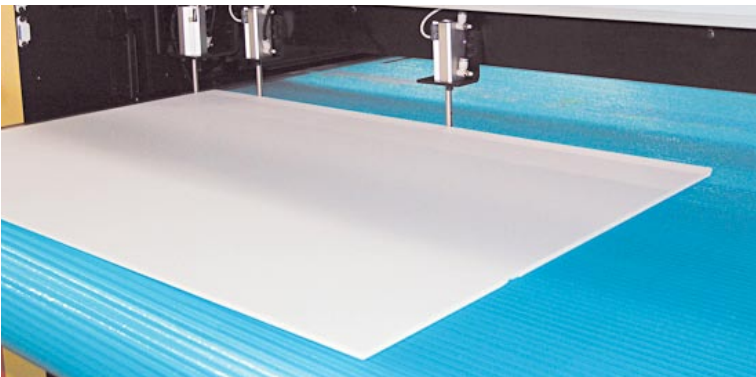
Transport belt

STRUCTURE OF THE PRINTER: Transport Belt

18. Describe the transport belt? What material? What manufacturer?

The belt is a flexible weave material of PVC. It has a 2 cm “seam” at both edges.

The downside of a flexible weave is that it can eventually potentially be pulled slightly out of shape by use. Belts that are solid may track well but are especially difficult to replace. So each kind of combo belt has its pros and cons.



19. Size, does it stick out?

Yes, the transport belt area sticks out both front and back from the housing for the printhead carriage.

20. How well does this belt hold up to heavy use? Does it skew?

You can check this yourself to some degree by looking at the transport belt from either side. Have the lighting shine on the belt so that you can see the horizontal sections. What you want to see is whether the woven aspect of the belt remains straight, or whether it has shifted from stress and strain. Dilli has strict Q/A guide line to control for the belt feeding. It is our know-how no other maker has it.

Several other UV printers have an infamous record of belts that may be so unstable that they “wander.” This is the word that an owner of an Octopus combo-style printer used.

But with even the combo belts that are considered acceptable, some materials will skew: depends on belt usage, wear-and-tear, on material weight and surface characteristics, etc.

21. How often does the main flatbed transport belt need to be replaced? At whose expense? What is the cost of a replacement belt?

Replacement frequency of transport belt is generally from 6 to 12 months. If you don't have any problem on printing, you don't need to replace it. Dilli's new belt is supplied at a lower price than other manufacturer's

22. What is the procedure for removing the old belt and putting on a new transport belt?

You remove one wire (that runs the width of the belt) and that releases the entire unit.

23. How many rollers control the belt: is the path of the belt horizontal, or triangular?

As usual elsewhere, there is one drive roller and one driven roller, one at the front the other at the back. In between is a rectangular horizontal vacuum bed, essentially the same kind of bed you get on a dedicated flatbed printer.

The IP&I Revo has three rollers; the IP&I Cube260uv has four rollers that control the transport belt. This adjustment and alignment control system on the IP&I Cube UV printers is the most sophisticated I have yet noticed.

24. Which is the drive roller for the transport belt (where is the motor and what kind of motor turns the transport belt?)

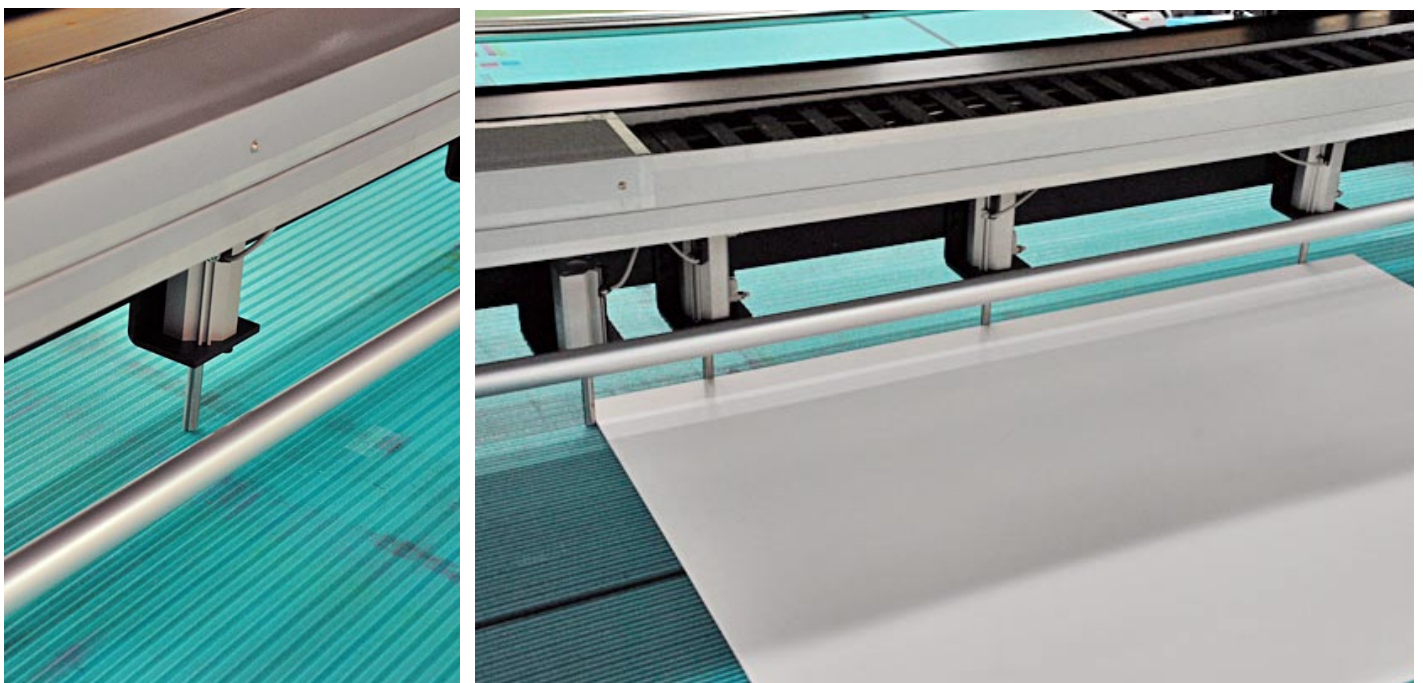
The front roller is the drive roller; the motor area is visible at the left of the front roller.

LINING UP FLAT MATERIAL (to help it feed straight)**25. Is there a registration gate that is lowered across the back printing area?**

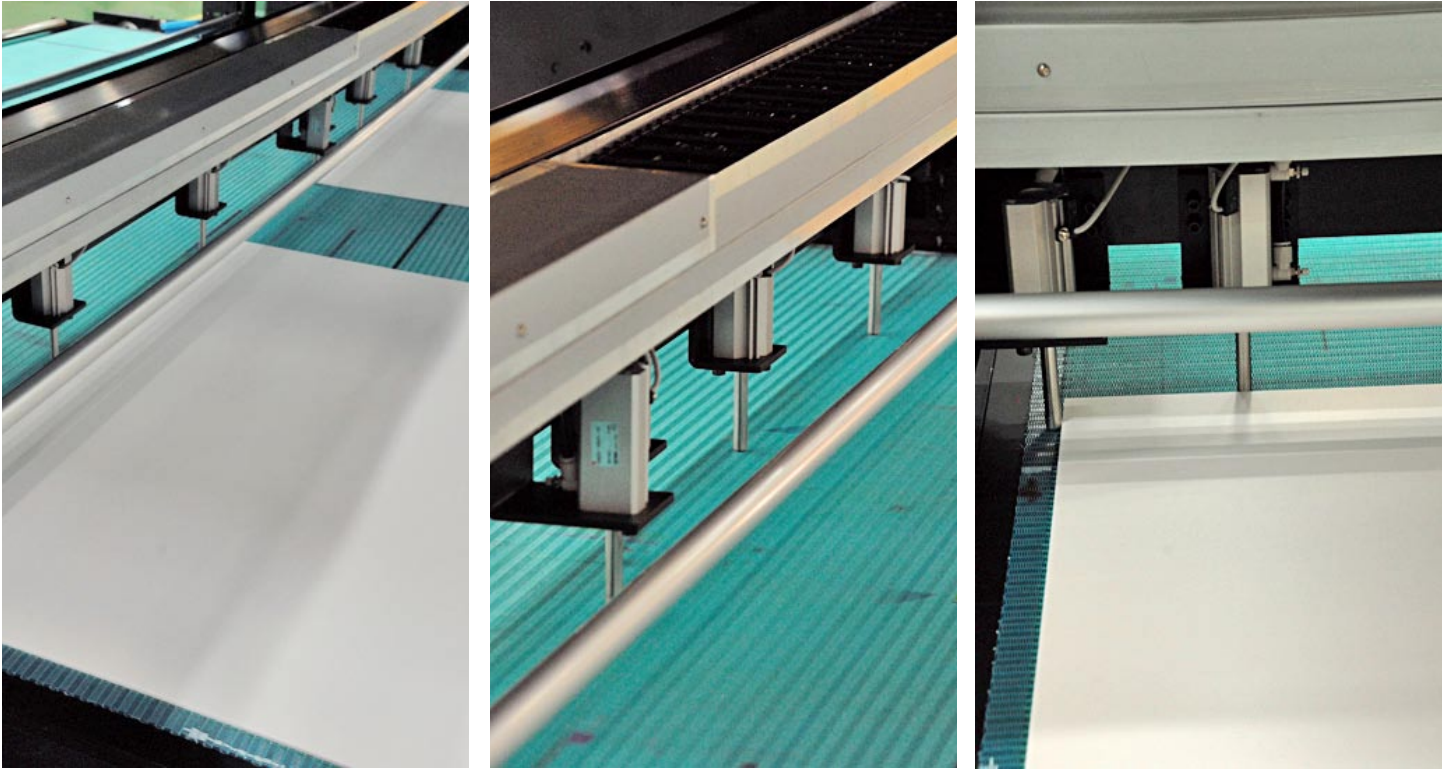
Most printshops report that most rigid media is crudely cut and rarely are the edges really at 90° to each other. So you don't really want to align a corner, you want to align one side (on one end).

Nonetheless, most printers assume that the board will be totally rectangular, so they put the pins in positions so it can capture the corner of a rectangular board. In the case of this Dilli printer, there are two sets of pins; each of four pins. The two sets are so that you can align two boards parallel to each other (like the Durst Rho 800 and ColorSpan 9840uv do with different alignment systems).

Each set has three drop-down pins at the back (the front of the piece you are aligning) and one for the side (to form a corner alignment).



Alignment system for flat material

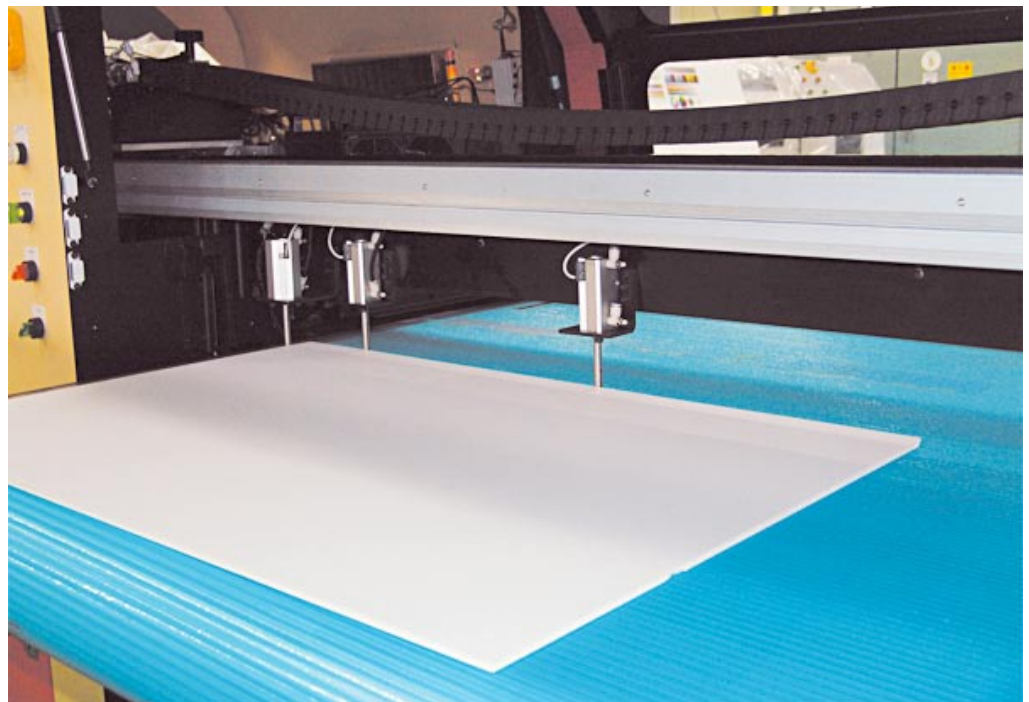


Different views of the alignment system

FLATBED ASPECTS (for dedicated flatbeds)

26. Is pin registration present? How many pins? What is their position(s)?

Pin registration normally implies pins that rise up from a dedicated flatbed or comparable system. Since this is a combo system, and not a full-time flatbed, its pins come down from a registration gate.



Pin registration is present when flat material is aligned

ROLL-FED

27. How is media held flat? Vacuum table? Pinch rollers?

There are no pinch rollers, so a vacuum under the open-weave transport belt does the best it can to hold materials down.

28. How is the roll held at the feeding position? On a spindle? On a saddle?

On a spindle.

A saddle is formed of two rolls with a slight space between them. You rest your roll of substrate on the saddle created by the two adjacent rolls. You don't need to run a spindle through the roll. You don't need to fumble loading the end of the spindle into two holders (one at each end). Loading a saddle is quicker as a result. But a saddle is primarily used on heavy-duty industrial printers 3.2 meters or wider where the weight of a roll may cause a spindle to sag. Plus, it's a headache to thread a spindle through a 5-meter long core.

29. Is there an air (pressure) core system?

Air core spindles tend to be used only on grand-format printers costing over a quarter of a million dollars.

30. How is the roll media handled at feeding position? For example, is there a dancer bar? If there is no dancer bar, is there at least a tension bar?

There is a tension bar that goes up and down. A dancer bar tends to move diagonally.

31. Is the feeding area for roll-fed material physically attached to the printer or is it out in front and not attached (as on the GRAPO Octopus).

The feeding mechanism for roll-fed material is physically attached to the printer.

32. If a combo system, does the media feed directly onto the transport belt or is there an intermediate roller bar out in front?

Chinese-designed systems tend to have an intermediate roller bar out in front. The Dilli is made in Korea and does not have any intermediate roller bar in front.

33. How is the roll media handled at take-up position? For example, is there a dancer bar? If there is no dancer bar, is there at least a tension bar?

There is a tension bar at both the front and at the back.

34. Describe the overall path of the media through the system?

A simple path is neither a major benefit nor a defect. A simple path means that it's easier to load and there is less to go wrong. A more sophisticated system may have advantages for feeding some kinds of media.

35. How much media is wasted during loading and feeding?

With some brands of printers you suspect that they are deliberately designed to waste ink and media since this is how those companies get their profits. Media is moved too far out before you can cut it, resulting in media being wasted before and after cutting, etc.

There is less waste on a dedicated flatbed printer because there is no material used in loading or feeding up to the point it is printed upon.

36. Can you print on more than one roll of substrate simultaneously?

Being able to print on several different rolls of material simultaneously is common on grand format solvent-based printers but almost unknown (and unavailable) on printers less than 104 inches. The Durst Rho 351R offers an option to allow printing on two different rolls simultaneously.

37. For handling ink that passes through the weave of fabrics or mesh, is there a trough? Or other mechanism to catch the ink?

A trough is possible only on a printer with a fixed platen; there is no easy way to put a trough on a combo style printer. If you need to print on fabric or mesh with a UV combo printer you need a liner or you need to put an intermediate sheet onto the surface of the conveyor belt (or clean up the ink that passes through the weave).

38. Is there a cutter? Is it manual or automatic.

Most combo-style printers have no on-board cutters. The Durst Rho 351R has a manual cutter since this is a dedicated roll-to-roll printer (meaning it has no moving conveyor belt). So roll-to-roll systems are more likely to have an appropriate location for a cutting element and even potentially a cutting slot.

39. Is there a “knife guide,” a slot where you can draw your knife down and across the width of the substrate?

Most combo-style printers have no area to put such a knife slot.

STRUCTURE: Miscellaneous**40. Does the printer have levels built into the structure of the printer?**

The only entry-level or mid-range hybrid or combo printer where I have noticed levels actually incorporated into the structure of the printer are the UV-curable printers of Dilli. Three levels are included: one in the middle of the gantry area; one on either side of the main area.

41. Does the printer have leveling supports? How many, and how strong?

Leveling any UV printer is crucial. Indeed at the Dilli factory, once the structure is leveled in the assembly room, rather than roll it from stage to stage, all construction stages take place with the printer not moving from stall to stall.

42. Does the printer have wheels? How many, and how strong?

Eight wheels and eight leveling supports.

43. Is the motor a linear motor or a stepper motor?

Servo motor.



Wheels and leveling supports of the printer

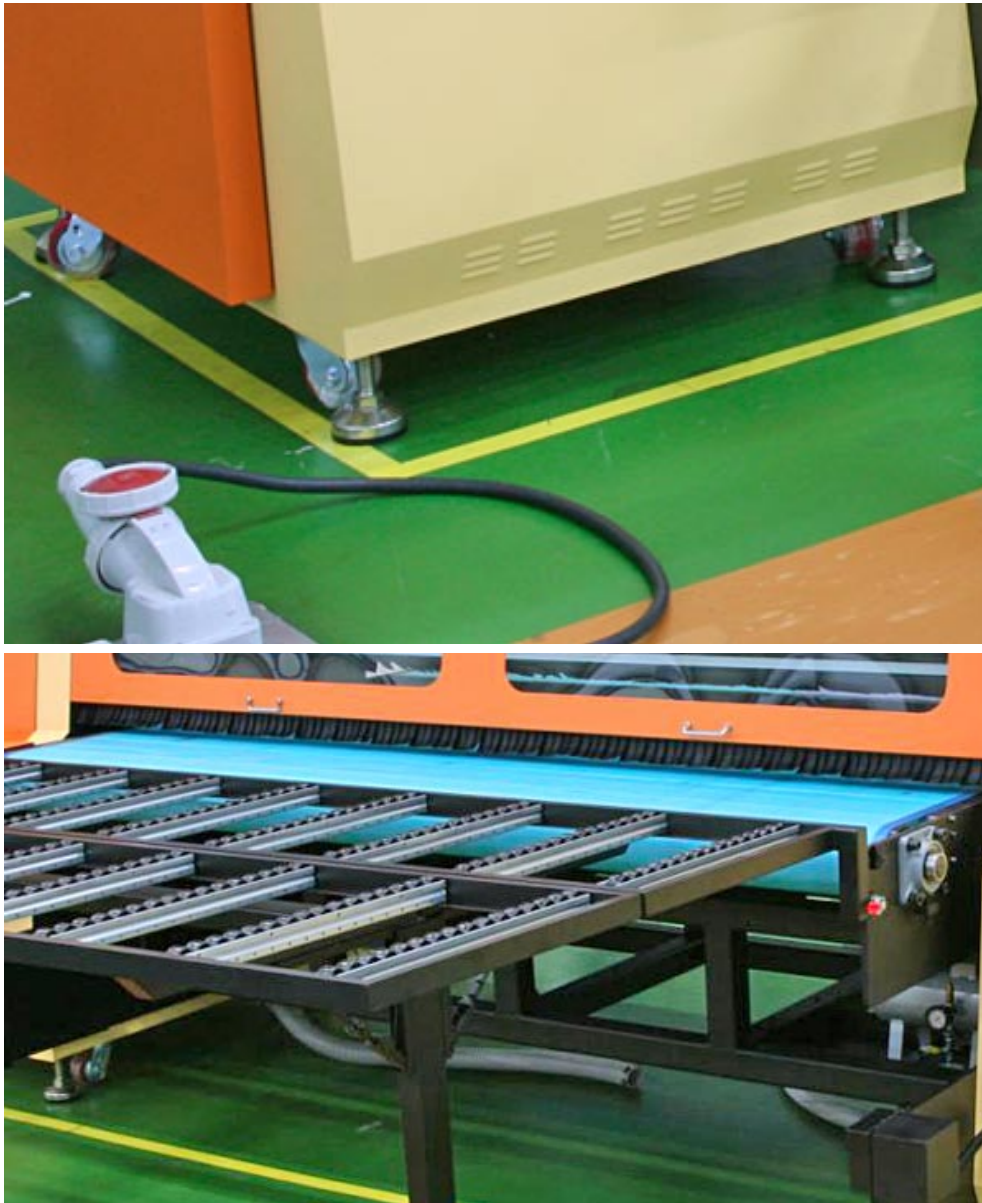
TABLES for Combo or Hybrid Flatbed

44. What is the design of the take-up table?

- Horizontal roller bars the full width of the table?
- Horizontal roller bars with rigid supports in the middle and/or elsewhere too?
- Separate flat bars with rows of tiny rollers?
- Solid flat table with small roller bars?
- Solid flat table with ball bearings?
- Another design?

Dilli has used the same basic table design for many years, which suggests that this design is efficient. Dilli has all the R&D necessary to have created a different design if something else were appreciably better for all concerned.

The design is two sets of nine vertical rows with small “wheels” on which flat media can roll.



45. If there is a row of rollers set into a bar, can you slide the individual bar to a new position?

It is rare that you can slide any individual bar, or roller, to a new position. The only table that I can remember that had movable features was that on the ColorSpan 72UV printers.

46. Are there only two legs (at the front) or are there four supports?

Although there are four wheels, there are really only two legs. The back of the table is not held up by legs, but by a solid attachment to the table.

47. Do the legs have wheels, or leveling system, or both?

The wheels of the add-on tables are simultaneously leveling supports. For the printer itself, due to the tonnage that has to be supported, the printer wheels are separate from the printer leveling supports.

48. Are the vertical supports (the legs) at the corners or elsewhere?

The legs are not at the corners at all, but one third back.

49. If the table(s) are of roller bars, how are cross-supports situated? Same level as rollers? Or under the rollers?

The upper structure of the table is all at one level; the same level as the roller bars.

50. Is the table physically attached to the printer? Or just rolled up close to the printer?

The table is physically and firmly attached to the printer.

51. Does the table fold up into/onto the printer?

To remove the table you detach it from the front of the printer, fold it, and roll it away.

Miscellaneous

52. What moves:

- the flatbed platform,
- the printhead area,
- only the material (fed by roller table; then gripped and fed by the printhead area mechanism as on a regular printer; or both?

Most traditional combo style UV printers move rigid materials with the transport belt and move roll-fed materials through a combination of the transport belt and the roll-feeding and take-up rollers.

53. If the objects you are printing are not as wide as the full width of the printer, does the printing carriage still have to cross the entire space, or can the printing assembly hover just over the area of what has to be printed (and thereby be a bit faster?).

Yes, most sophisticated printers can hover. But this may cause too much heat build up over one part of the printer. So your software also needs to be able to modify the hovering position if so desired.

OPERATING THE PRINTER

54. Can the operator manage print jobs via the Internet with this printer?

Most UV printers do not allow operation or interaction via the Internet.

55. What sensors does the printer have?

- Front hood open sensor
- Back hood open sensor
- Waste tank full sensor
- Main Ink tank full/empty sensor
- Sub ink tank full/empty sensor
- UV lamp ready sensor

56. In the main area for operation, is the machine software based (touch screen), or with physical control buttons? Or both?

There are physical control buttons and switches, in addition to a keyboard and monitor. There are also physical control dials, such as for reading the temperature.

57. Do you get an LCD screen in the printer or a real computer monitor? How big is the screen or monitor?

You get an actual monitor, approximately 17" in size.

58. Is the position of the LCD screen or monitor user-adaptable?

The LCD monitor is flush-mounted into the front of the printer and thus is not user-adaptable as to position or angle of viewing.

59. Where does the computer keyboard sit?

The computer keyboard sits on a ledge that sticks out from near below the monitor. You can move the keyboard a bit, but not much.

60. Is there a drawer under where the computer keyboard is (a drawer for storing odds and ends)?

No drawer.

61. Where does the operator stand or sit?

Front right, where the LCD monitor is situated.

62. What aspects of the printer can you operate from behind (the loading area)?

At the left rear, lower down, there are some operational features for the ink levels, etc.

63. What controls are on either end?

There are no controls at the right end; just one large cabinet door.



LCD screen and keyboard

64. Is a foot pedal included (for operating aspects of the printer)?

No foot pedal is visible.

65. How many operators or operator assistants does this printer require?

Only one operator is needed. But when loading a full-width roll of paper it helps to have a second person lift one end of the roll.

66. Is there a pole with beacon lights?

Dilli was among the first to use a vertical pole with beacon lights. Most other printers do not have such a beacon. Presence of a beacon a nice added feature but is not a major plus point; absence of a beacon is not a significant minus point.



Dilli Neo Venus at SGIA 07

CONSTRUCTION (BUILD QUALITY)**67. What kind of testing is done in the factory of the incoming parts?**

Dilli (and its sibling company D.G.I.) have the most rigorous parts testing facilities that I have seen in this region. Both Dilli and D.G.I. each have separate research institutes as well.

68. What is the solid-ness of the construction of the outer body? Is it plastic? Metal?**Heavy gauge?**

The outer shell and the inner structure are well designed and of metal. This is not a cheap plastic low-bid machine.

69. Is there both a front hood and a back hood?

Yes, there is a front hood and a back hood also. They are metal; the front hood has four panes of Plexiglas; the back hood has no glass.

70. Does the printer wobble back and forth when printing?

Dilli printers don't wobble and shake when they are printing.

AESTHETICS

71. How would you describe the design of the printer?

Attention has been made to create a machine which is attractive, as well as functional.

72. Can you easily distinguish which is the “front” and which is the “back”?

I call the front the area where the LCD and operator panel(s) are situated. This area is clearly visible on the Dilli Neo Venus.

The area with controls, LCD monitor, and keyboard is usually where the finished printed material comes out. This usually means that the other side is where you feed the material in. I call that the back. But many printer companies call the feeding area the front. It makes no difference as long as you define what you mean in advance.

Some UV-curable printers have a moveable control computer that can be situated at one end, or at the feeding area (whichever location the operator prefers). But the standard arrangement is that the LCD and keyboard are on the output side. I call this the front.



Front of the printer



Back of the printer

SET-UP OF THE PRINTER: PRACTICAL CONSIDERATIONS

73. What are the electrical requirements of this printer? This means, will the building have to be rewired.

3 phase AC 380V 50/60 Hz; optional AC 240V, 50/60 Hz.

74. Do you need to budget installing a ventilation or room exhaust system?

There are two duct openings in the top of the machine. Dilli provides ventilation duct pipes and an attachment ring. Some other UV printer companies ignore the need for ventilation in order to produce a cheap machine.

All UV printers need room ventilation, for everything from ozone to misting ink to general odor. Increasingly ozone production is surprised; this has led some companies to claim that “no ventilation is needed.” Such a claim is dangerous, especially in a country like the US where litigation is so common.

I have not yet detected serious misting in the Dilli printers, but I would not expect every printer to be equal; would depend on maintenance and other factors. Nonetheless, Dilli is one of the few companies that provides an entire ventilation hose and attachment clasp for one of the two ventilation ducts.

75. Are there any special temperature or humidity requirements or preferences of this printing system?

Temperature and humidity are indeed crucial, especially humidity. Even more important is that whatever temperature and humidity is present in the work area, that it not vary during the day: cool in morning, hot by 11 am. Hotter by 2 pm.

76. What about altitude? Some cities such as Guatemala City are at a high altitude?

Almost no spec sheet and not even many User Manuals mention anything about altitude. But Guatemala City is about 1500 meters above sea level (which is rather high; there are four volcanoes visible out my window as I write this), and other parts of the world have even higher elevation.

77. What about dust and cleanliness of the air?

Dust in the printing environment is an aspect that is often neglected. It is crucial that if a sign shop, that no sanding, sawing, routing, sandblasting, or grinding operations be nearby. The dust and debris from sawing and comparable operations are extremely unhealthy for a UV printer.

In other words, you need to ventilate away more than ozone and ink odors; you need to ventilate away everything else that is already in the printshop environment.

78. What is the connectivity? Network, SCSI, FireWire, USB or USB 2, or other?

I/O card PCI7200, LAN, USB (not indicating whether USB 2).

79. What is the size and weight of the printer?

4.82 x 2.35 x 1.815 meters with a weight of 2,500 kg.

80. How many boxes arrive?

Two boxes arrive; one with the printer, the other with the tables.

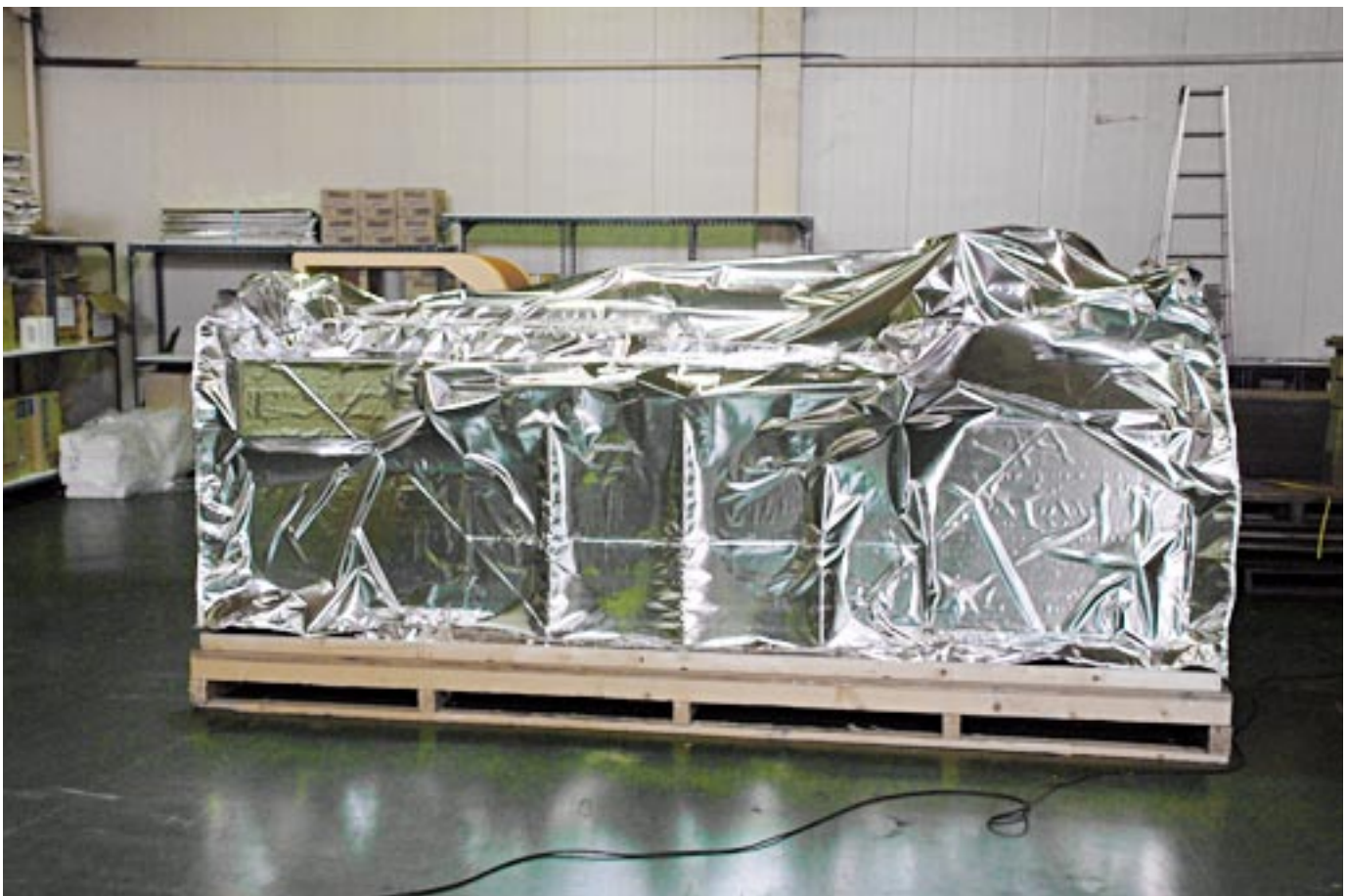
The printer is vacuum sealed at the factory. I have not noticed this feature yet at any other factory. This is another example of how Dilli puts extra effort into the quality of their printers.

81. Does the printer have lifting hooks on the top, or elsewhere?

There are two strong lifting hooks at the top of the printer in case you may wish to lift the entire printer during installation.



Set up of the printer to be shipped



INSTALLATION OF THE PRINTER

82. Which manuals are hard-copy? Which manuals are only on CD?

The User's Guide is hard-copy.



Dilli Neo Venus hard copy manual

83. What is the rating of usefulness of the User's Manual and other associated materials?

The User's Guide is 113 pages which is of normal size.

84. Is there a glossary in the User's Manual?

Most user's manuals lack a glossary.

85. What is the native language of these guides? Is the translation acceptable?

The native language is Korean. The translation is better than most manuals of other brands that have been translated from Chinese.

But no matter how well translated, all translations done by a speaker for whom English is a second or third language should have the translation proof-read by a native English speaker. If a company is selling printers into the US, the translation needs to be fully and completely comparable to spoken English, not literal English.

86. What kind of cut-away drawings or other drawings exist that show the various parts of the printer?

There are no cut-away drawings or exploded views to show details; only photos with arrows to point out the features. The best exploded views of any product in the world are those by Canon camera.

87. How hard, or easy, are the manuals to obtain BEFORE you buy the printer?

The manuals were provided to FLAAR as soon as we requested them. Some other printer manufacturers hide their manuals because they don't want anyone to see them. Yet MacDermid ColorSpan offered their manuals on-line (on their web site).

TRAINING

88. Is training necessary?

Yes, training is essential for any UV printer, whether an entry-level machine or high-end. The Dilli User's Guide states quite openly that training and experience are essential.

Lack of training, incomplete training, and lack/or of experience are a factor in about a third of the problems that people have with UV printers. Another third is often inadequate cleaning and maintenance of the ink and printhead system. The other third cause of problems would naturally be weak parts (that wear out before they should), wear-and-tear (happens even to the strongest parts made in Switzerland), and features that need improvement, etc).

89. Is classroom training available?

No, classroom training is not common.

90. Is factory training available?

There is no regularly scheduled factory training though by special request you may arrange factory training. Increasingly printshop owners, managers and/or printer operators are learning that it's a good investment to visit the factory of the company whose printer they are purchasing. The Dilli management was very hospitable during my several day visit.

91. What on-line training is available?

Fewer than 5% of the UV printer manufacturers offer on-line training.

TECH SUPPORT & WARRANTY

92. What is the original warranty period?

12 months.

93. Does it include parts, labor, printheads?

Printheads are replaced only if DOA (Dead on Arrival).

94. What happens if the tech support from your local distributor is uninspired or inadequate?

Can you telephone the manufacturer directly? If so, will be manufacturer actively assist you, or only begrudgingly?

MacDermid ColorSpan was good at providing direct manufacturer's tech support. Whether this will continue under HP ownership is not yet known. Dilli also can provide manufacturer's tech support if absolutely needed. Some other manufacturers simply don't provide tech support themselves, or only begrudgingly: they expect their dealers to provide support. We have several instances in Australia of poor tech support for GRAPO printers and the printshop owner rated the backup from the manufacturer in the Czech Republic as unsatisfactory (that's putting it about as politely as I can; the situation was quite unbearable for two owners in Australia). GRAPO did not refuse support, but not enough was spontaneous to resolve the situation with the end-user.

An inadequate dealer or distributor is a good recipe for endless headaches. Choosing a distributor is as important as selecting a brand and model of printer.

95. Can the manufacturer remotely diagnose the printer?

Remote diagnosis is rare, and not available on any mid-range UV-curable inkjet printer.

CLEANING & MAINTENANCE NEEDS

96. How is head cleaning accomplished? purge, suction, manual, other?

Purging.

97. To what degree is purging automatic (once you press a button), and to what degree is it manual?

You press a button, so in this sense it is manual.

98. How often should you purge? Does the User's Manual honestly indicate how often you should purge?

The Dilli User's Guide is honest in that it clearly states that you should purge after every hour of printing or when printing over 20 square meters.

99. If done with a flush solution, how do you add the flush to the printheads? With a syringe, or a manual button or toggle switch, or automatically with software command, or other method?

As with most mid-range UV printers, you manually turn a valve to open the ink lines so that the flush will flow into them. In cheaper printers you have to inject the flush with a syringe by hand.

100. The ink that is purged, where does it go? Into a drain/waste bottle, or into a drip tray?

The ink is purged into a drip tray, and from here it is guided via a tube to the waste ink container.

101. Is capping on a sponge or on a metal fitting? Do you cover the caps with cellophane, or is capping direct?

Capping is on a sponge, with cellophane placed between the printhead and the sponge.

102. Is the service area the same as the parking area?

Capping is done at the left end; parking can be done at the right for overnight. But you can also park at the left during a work day.

103. Does this printer spit, or "weep" ("flash") ink at regular intervals?

Yes, this printer can weep. The user can vary the weep time and amount.

Solvent inkjet printers spit ink at the end of every pass in order to keep all printhead nozzles open. The reason is that if you are printing a banner with an area of pure cyan, then the other printheads will not be jetting ink (since their colors are not called for). In theory these nozzles will clog while not being used. So spitting allows all nozzles to eject ink occasionally.

Another way to allow all nozzles to squirt ink periodically is to have a band of CMYK or a band of six colors (CMYK light Cyan light Magenta) at one or both edges of the image, immediately outside the image area. This pattern causes every color to jet even if these colors are not being printed in the image itself.

Although most UV printers do not require a band of printable colors along the edge, many UV printer manufacturers do recommend spitting. However some UV printers do not have a spitting capability.

MAINTENANCE

104. How do you clean the transport belt?

You can clean UV-cured ink off with alcohol, but since it's an open-weave transport belt, the ink gets down into the weave. This can't be cleaned off easily (it might drop down into the holes of the vacuum table).

105. How long can the printer sit unused?

If idle for more than several days, it is recommended to flush ink from print heads completely and replace with print head flush solution. Actually it is best to use your UV printer every day. If you are not going to use it every day, fill the system with flush solution and cap the heads (please note: this procedure varies considerably from one printer to another; some have no capping station; others you have to inject flush with a syringe).

Check with an experienced tech support person, but merely turning your UV printer on for a test print every few days is NOT what is meant by using your printer every day. It may be better to fill it with flush and not use it at all. But this depends on the plumbing system of your specific printer, so check with tech support: we are not a medical doctor for specific individual printing problems; just trying to get the message out: UV (and solvent) printers are designed to print; not to sit unused.

106. How should a printer be prepared for sitting unused for a long time?

Solvent printers need to be used every day. Otherwise the ink dries in the nozzles and nozzle plate of the printheads. It was an early mantra that UV ink escaped all the problems of solvent printers: that you never had to weep (spit at the end of every pass); that you never had to purge; etc.

But in reality UV-curable ink has comparable issues, plus the added problem of curing inside the nozzles. Cationic ink can cure spontaneously (once initiated) all the way back into the ink tubes. Fortunately most printers don't use cationic ink; they use free-radical curing chemistry.

But reflected light can cure the ink inside the nozzles; heat can cause gelation which can clog the heads. So in some printers the heads are capped at night; in some printers you have to fill the ink lines with flush if you don't print frequently. Indeed a UV printer is intended to be used every day. We just received an e-mail from an end-user whose printer had endless issues. He said they used it seldom because of other issues. My first question was whether the infrequent use was a cause of at least some of the issues.

SAFETY & HEALTH CONCERNS

107. Is the machine enclosed, or exposed?

The printer is acceptably enclosed.

108. Does the hood close down completely to seal the system, or are there a few inches open at the bottom?

The hood on any hybrid or combo system must allow space for boards to pass through, so its hood can never close down tightly onto the platen area. The design must allow space; this space should be closed off with a skirt. Some printers use flaps or rubber like material; other printers use skirts of brush-like material.

The space on the Dilli system (to allow thick boards to pass through) is about 3 inches high. This space is covered with a skirt of rubber-like flaps. The skirt segments are slightly overlapping.

109. Is there a skirt at the back as well as at the front?

There is a protective skirt across the back as well as across the front.

110. How easy is it to obtain the MSDS of the ink?

The MSDS of all the inks is included in the user's guide.

For other print brands it is usually rare that the MSDS of the ink is easy to obtain. If the MSDS is an auto-download from the company website, this is how it should be. But most companies do not wish the end user to know which brand of ink is being used, so hiding the MSDS is not necessarily an attempt to hide the dangers, but may be to hide the source of the ink.

PRINthead TECHNOLOGY

111. Which brand printhead is used?

The Dilli Neo Venus uses the Spectra Galaxy 256 head with a 50 picoliter drop size.

Most UV printers made in the US, Japan, and Europe use Spectra, Ricoh, or KonicaMinolta heads. VUTEk is one of the few that uses Seiko printheads.

112. How many total number of printheads?

Either six or eight.

113. What is the position of the white printheads relative to the rest?

One of the two white printheads is off-set, so that it can jet down a flood coat.

114. Is the printhead for the white ink the same model as the printhead for the other colors?

In the beginning, DuPont tried to use a printhead for the white ink that had a larger droplet size. However gradually they switched to using all the same model printheads. The reason a larger drop size for white ink is a good idea is because otherwise you need two printheads in order to make the white ink opaque enough. But it turns out you need two printheads for white ink anyway, so that you can jet down a flood coat of white before the rest of the colors (when printing on transparent or translucent materials).

PRINTHEAD DPI & Features

115. What is the drop size in picoliters?

Drop size is 50 picoliters. In comparison the drop size of the HP Designjet 5000 was about 14-15 picoliters. A larger drop size is better for speed printing billboards and banners. A smaller drop size is good for POP signs and other prints that will be viewed up close.

116. What is the advertised DPI, and is it true dpi or “apparent” dpi? How is dpi presented (with what adjectives)? How is this dpi calculated?

The Dilli brochure advertises 635 x 800 dpi.

117. How many passes can this printer achieve?

This system can handle from 6 pass speed to 16 pass quality: 6, 8, 12, 16 passes.

The lower the number of passes, the faster the printer prints, but the lower the quality. At a printer's fastest rated speed, the output is usually unusable for most applications other than distant viewing for a billboard or banner. To achieve viewing quality for Point of Purchase or an honest photo quality, you generally need to set the number of passes at the highest number (which results in the slowest speed).

118. Does the software use passes or modes to describe quality levels?

FLAAR prefers to use consistent terms that are standardized for all printers so that printshop owners, managers and printer operators have a fair chance of comparing speed vs quality. By not identifying the actual passes, or by defining pass in an atypical manner, this results, in effect, in hiding the reality of speed vs quality. Thus we commend Dilli for keeping with the traditional usage of the term pass(es).

Increasingly other printer companies are not listing the passes that their printers run back and forth. The definition of a pass is not consistent in any event: FLAAR defines a single pass as the movement of the printer carriage, while jetting ink, from one side to the other. There is a difference between “single pass” and “one pass” but that needs an entire article (one pass means a page-width row of non-moving printheads).

Mutoh describes one pass as a complete back-and-forth movement (FLAAR defines that as two passes).

Most printer manufacturers would rather avoid having to state clearly how many actual passes it takes to achieve specific quality levels. So they create “modes” that are a combination of passes and possibly other features that result in a specific quality level.

PRINTHEAD Positioning

119. Are the printheads in a straight row, or staggered?

The normal position for printheads is parallel to each other in a row. But there are exceptions, and staggered the positions may have other benefits. Each pattern for positioning the printheads has a reason, but most printheads are simply parallel to each other in one row.

120. Do you raise the heads manually, with click stops, or motorized?

Motorized.

121. How complex is the procedure to align the printheads?

You can align the printheads for left-right tilt and also top-down.

PRINthead: Associated Features

122. Is there a heater associated with each printhead?

Yes, each head has it's own heater for it's ink.

123. Or is the entire plate heated and thereby some heat gets to the heads?

Heating the metal plate that holds the nozzle-plate area of the printheads as a group (the base of the printhead carriage so to speak) is a cheap way that early Chinese printers did their heating. I don't know of any serious UV-curable inkjet printer manufacturer outside China that uses a heated plate to heat their ink (but with 45 manufacturers, there are always surprises).

124. Can the firing frequency be varied by the end-user?

The wave form is optimized with Dilli ink for the best printing quality. The 3rd party ink is not allowed

SUBSTRATES

125. Can this printer handle printer rigid material only, or roll-to-roll only, or both interchangeably?

This model can handle both rigid and roll-fed materials.

126. What sizes of material can be printed on?

Maximum output width is 2.49 meters.

127. What is the difference between media width and actual print width?

We have this entry because some printers are called "3.2" because they accept substrates that are 3.2 wide, but the printer can actually print only 3.1 meters. In such a case the model name is misleading (and incorrect in a sense). I have even seen some model designations claiming 3.3 when they only hold media 3.2 meters. So there is a bit of misleading advertising out there.

Dilli	Print width	Material width	Claimed by how the model is named
Neo Venus	2.49		The model designation is not based on the print width.

Dilli does not cheat by using a model designation that suggests a wider printing area than it can actually produce.

128. What about edge-to-edge printing (borderless)?

Yes, edge-to-edge borderless printing is possible.

129. Can you adjust the rate of media feed?

You need to adjust the rate of feed to remove banding lines caused by media feed that is slightly off. This is not the fault of the printer but a result of the fact that each different kind of material feeds slightly differently.

130. Can you measure the height of the material with a sensor, or is it manual?

What you really want to measure is the printhead gap height: the space (gap) between the top of the material and the nozzle plate (the “printhead”).

The Dilli system can situate the printhead base between 2 mm to 6 mm from the top of the material being printed on.

131. What materials does the manufacturer list?

- Flex
- Wood
- Steel
- Vinyl
- Mesh
- Acrylic

are listed in the User’s Guide.



Gap between the printheads and the material

SUBSTRATES, Issues

132. Heat concerns: will the heat generated by the UV curing lamps cause adverse effects to some delicate forms of heat-sensitive media? Which materials might curl, distort or discolor from the heat?

Heat sensitive materials would include polyethylene, polypropylene, shrink-wrap, very thin and thermal sensitive papers, plastic coated cartons, PVC and aluminum foil (www.dotprint.com/fgen/prod1297.htm).

Oce lists several other common signage materials as sensitive to the heat of UV lamps. For these reasons we have a separate FLAAR Report on applications and materials.

Heat can build up when the printhead carriage hovers over a small area to print a narrow job. Heat can build up inside the printer as materials (especially metal) absorb heat and hold it (and then radiate it out for a long time). So heat is not only an issue from the obvious and immediate heat of the UV lamps. Residual heat can be an issue as well.

You can in effect lower the heat that reaches the material by raising the entire printhead carriage. However this results in noticeably less quality (because the ink is flying through the air a longer distance while the material is moving away from it). You can also set the printhead carriage to move further away from the printing area at the end of each pass (in those cases that the media is less than the maximum and in those cases where these settings are facilitated by the printer design and firmware).

On this Dilli Neo Venus if there is overheating there is a shut-down system to prevent fire: first the shutter closes then the lamp goes off. Users of other brands of printer, such as GRAPO, report that their printers did catch on fire.

133. What about build up of static electricity? What kind of materials cause this? Do some materials generate static electricity which cause the media to attract ink in areas not supposed to be printed on. How is it manifested?

You do need to be aware of how to prevent static electricity build up:

- No carpets or rugs on the floor. Indeed you should consider anti-static tiles or carpet.
- Use a humidifier during winter months to avoid dryness
- Learn which media are susceptible to gathering a static charge.
- Consider a printer that has specific anti-static features:
 - Grounding
 - Static bar(s).

Most printer reps suggest this is more an environmental issue than a printer or ink issue. They say you can't have carpet and you must maintain a high humidity. They admit that the static electricity situation varies depending on each site's situation.

Nonetheless, some UV printers already have anti-static systems carefully built into their printers. When these work it documents that the investment is well spent. However if the low price of your printer is in part because there is no on-board static system, and if you indeed have a static issue, the natural question is why, since this is such a well-known issue, did your brand not have an anti-static system or if so, why does it not work satisfactorily.

134. What happens in very dry weather (low humidity), especially in winter with central heating?

During dry periods (with low humidity) static problems may increase. With a high static charge (such as with PVC materials), the ink is attracted to charged areas of the material. This results in overspray (ink laydown in unintended areas).

SUBSTRATES: Cleaning, Priming, Preparation**135. Do you have to brush off or otherwise clean each sheet of incoming material by hand before you print on it?**

Generally yes. The need to clean incoming materials is typical of any printer. Some materials have more detritus or dust or issues than other materials. And some suppliers offer better materials than others.

136. Which substrates ought to be laminated, top-coated, or otherwise post-treated?

Realize that top-coating (a UV clearcoat) may be useful on some materials and even possibly required on some applications. This may require an additional machine, space, training, and further ventilation considerations. You are not protecting against the sun, you are protecting against the ink rubbing off slippery surfaces such as glass or marble.

Lamination can also serve to provide a glossy finish on a material that is naturally matte.

SUBSTRATES: General Concerns**137. Although this printer “prints on almost all materials,” what is the adhesion rate with most materials? Does the ink easily scratch off certain materials?**

Realize that all statements must be judged based on how long the ink has been on the material, and the surface nature of the material. Not all fluted plastic material is the same; and six months later the adhesion could theoretically be different (based on conditions of display and the nature of the surface of the material).

Adhesion may be difficult on polypropylene and Lexan. Some UV ink does not work well on Coroplast, or prints well but begins to fall off after several months.

138. What other problems in feeding exist? For heavy material? For light material?

Just realize that no transport belt on any combo-style design can feed all materials with the same precision. Some materials will go through okay; others will skip or stutter, and some may skew. This also happens on expensive VUTEK 200/600 transport belts.

And what feeds well during a test may react differently when you are in full production day after day (when the belt gets worn, and a bit out of kilter).

The worst cases of skew that we have heard of are from the GRAPO Octopus and from the DuPont Cromaprint 22uv.

APPLICATIONS

139. Can you print on textiles or fabrics? How do you handle the ink that gets through the weave?

There are two issues with printing on fabrics: first, the ink goes through the weave and ends up on the table or transport belt or platen. Second, the fibers from fabrics or mats can get onto the printhead nozzle plate and sometimes up into the nozzles.

INK

140. Is an extrudable or thermal-formable ink available from the printer manufacturer?

At present only Mimaki and Gandinnovations offer a special heat-formable UV-cured ink. For some other printers you can buy after-market heat-formable inks.

141. How many colors are used to produce output - four, six, or eight?

K, C, M, Y, LC, LM(6 colors) + 2W

142. Other than white, how many spot colors are available? What about metallic colors?

Spot colors are not normally offered.

143. What is shelf life of the ink (CMYK)?

Shelf life of the ink depends on storage temperature, plus on how honest the company was that delivered the ink. If the company bought too much ink, and could not sell it fast enough, they might be tempted to back date the shelf life.

144. What company makes the inks? Choices include DuPont, Jetrion (now InkWare/VUTEk), Hexion, Sericol, Sun, Triangle, KonicaMinolta, Toyo, Tetenal and several others.

For the Dilli Neo Plus printer (Spectra Nova printheads), the ink is from Sericol. For the Dilli Neo Venus (Spectra Galaxy printheads) and for the Dilli Neo Titan (KonicaMinolta printheads), the inks are from Sun Chemical.



Printer ink deposits

INK: White & Varnish

145. Is white ink available?

Yes, white ink is now available.

146. How many ink lines or printheads are dedicated to white ink? One or two?

Two ink lines (so two printheads) are dedicated to white ink.

147. Is the white ink opaque enough?

The following is a general statement and is not directed at any specific company, but is based on inspecting printshops that have white ink installed. The majority of printshops with white ink installed report that white ink has innumerable issues and is not as realistic to use in your printshop as it is portrayed in a trade show booth or a printer manufacturer demo room. I would not be convinced of the white ink of any company: whether European, US, or Japanese, until I have visited a print shop where it was functioning flawlessly over a several month period.

148. What is the shelf life?

Shelf life of the K, C, M, Y, LC, LM inks is one year; shelf life of the white ink is six months.

149. Is spot varnish available?

Spot varnish is being tested.

INK Cost

150. Does the refill container of ink come in cartridge, bottles or bulk? How large are the ink containers for this replacement ink?

Dilli uses 1-liter bottles.

Ink tends to come either in bottles (where you pour the ink into the ink container on the printer) or containers that are themselves the ink container: you take the old one out; throw it away; and place the new container in its place. Cartridges tend to only be used in printers with Epson printheads. No currently functioning UV printer uses Epson printheads: one Eastech printer tried, but it is not widely used.

151. How many liters of ink does the on-board ink container hold in the main tank?

CMYK ink containers are 2.5 liters. White ink container is 4 liters so it can have a circulation ("stirring") system built into it.

152. What is the cost per container? What is this cost translated to liters?

Cost of ink varies depending on the dealer/distributor, and depends on what country you are in. Usually the smaller and cheaper the printer, the more the ink costs. The larger the printer is, and the more ink it uses, the lower the ink is priced.

153. How do you know when the waste container is full?

A sensor triggers an audible buzzer and the blue lamp of the beacon tower of lights is illuminated.

154. Is there an out-of-ink alarm? Is there a warning before actually being out of ink?

There is a buzzer that sounds and the yellow light on the beacon pole of lights flashes.

INK: Supply System, Tubing, Filters, etc

155. How is new ink added? Pouring into the on-board container? Switching the container to the new ink container?

You pour the ink in.

156. What is the situation with the ink gelling?

Ink gels from heat; not only from UV light (since in theory the inside of the printer will have black ink lines so no UV light can reach the ink). But overall heat will cause UV ink to gel. But if you have some circulation within the tank and if the ink is far from the heat, gellation will not be as much an issue.

157. Is there an issue with “ink starvation?”

“Ink starvation” means that not enough ink can get to the printheads in fast printing modes. Ink starvation is a real issue that affects even some quarter-million dollar printers. So you need to check with end-users to see if they have issues with ink starvation.

Dilli does not have reports of ink starvation being a common issue.

158. Can the end-user vary the printhead temperature, or is the temperature fixed?

It is not advised to change the printhead (ink) temperature arbitrarily.

INK: Longevity

159. What is the longevity outdoors? What about in the full sun in direct sunlight?

In some cases the ink may last longer than the material on which it is printed.

160. What about solvents such as cleaning solvents? Do they mar, dull, or wash away the ink or change the surface quality, especially on vehicle wrap?

- Ammonia (in Windex and comparable cleaning liquids)
- Acetone
- Cleaning alcohol
- Gasoline
- Soap and water with sponge
- Soap and water with a broom (frequently used to clean vehicle wraps in Latin America, for example)
- Scotch-tape pull-off test

INK Color Gamut

161. Which colors print best?

Colors on maps, grays, purples, cigar color (so browns), are all nice.

162. Is the color gamut what your clients need for their logos and products? How about red? Does it turn out more orange? Is red bright enough in saturation to satisfy clients? Or are the colors overall a bit dull?

It is usual for most UV-cured inks to have the greens a tad overly yellow, and reds tend to be a bit orange. But on this Dilli printer this situation is better than most: for example, you can still achieve many acceptable reds.

THE UV CURING LAMPS

163. How many different sets of lamps are there? Is there pinning first and then curing later?

95% of UV-curable printers have only curing UV lamps. Only the Inca Spyder 150 and a few other innovative machines have a pinning lamp before the curing lamp.

164. What technology is used in curing lamps: microwave, continuous (mercury arc), LED, or flash (pulsed Xenon)?

Virtually all UV printers use mercury arc UV lamps. Only NUR and a few others use microwave UV lamps. Pulsed Xenon lamps have failed the few times they were tried (an early VUTEk UV printer circa 2000-2001; a cheap Oce Arizona 60uv printer). LED lamps are now being tried in several UV printers, such as by Sun LLC (in Russia). The Gerber Solara ion uses a rare type of long UV lamp that is not used by any other wide-format inkjet printer manufacturer.

165. What brand of lamp is used?

The NUR Expedio Inspiration uses Nordson microwave technology. Gandinnovations uses Dr Honle, but these are traditional mercury arc, not microwave. Mid-range and entry-level UV-curable printers tend to use UV mercury arc UV lamps from Integration Technology.

166. How many lamps does the printer use?

Two is the usual number of lamps. Some cheap Chinese printers use only one lamp. Mimaki uses one lamp on several of their narrow-format UV printers to avoid the lawnmower effect that is caused by bi-directional printing (bi-directional print requires two lamps, one for each direction of ink laydown by the printer carriage).

167. What shuts the lamps off?

For example, after so many minutes of not being used; or if they overheat?

This is a crucial question, and one seldom asked elsewhere: if your UV lamps need to be turned off after the printer being unused for 5 to 10 minutes, then your lamps' life gets used up quickly. Each strike (turning the lamp off and on one time) can lower the life of the lamp by one or two hours. So ideally you want a kind of UV lamp system where the lamps can stay on as long as possible to avoid having to turn them off and on all day long.



UV lamps

Another downside of having to turn the lamps off is that you then have to let them cool down, and then have to let them heat up again.

168. Is the lamp fan filter a user-replaceable item? How often should this be cleaned or replaced?

If the filter gets clogged with dust then it is less efficient in keeping down heat. Heat build-up is not good for the overall carriage area.

169. What is the true drying (curing) time of the inks used with this set of lamps? What factors influence the true (total) drying time?

No UV ink really cures within seconds. Some colors, depending on how thick the ink is laid down, may cure “instantly.” But several factors may result in a cure that takes 24 hours, 48 hours, or weeks. If you set the print mode for “glossy” this reduces the lamp intensity. These prints will outgas for weeks.

UV LAMPS: Cooling

170. Are there shutters?

Yes, and Dilli is one of the few companies where I have seen shutters being tested. Indeed Dilli makes its own testing equipment, sometimes in conjunction with their sibling company D.G.I.

Shutters help control light leak and save from having to turn the lamps off. So the lamps last a bit longer and you can be more productive, not having to wait for the lamps to cool down and then warm up all over again.

171. How often do the shutters stick?

The shutters on the Gandinnovations printer are pneumatic, so don't stick as often as mechanical shutters. DuPont Cromaprint 22uv printer seems to have issues with its shutters getting stuck (either stuck open or stuck shut). So DuPont had to switch to another solution. We occasionally hear of shutters of other brands of printers sticking as well. Indeed one company said they don't use shutters at all due to the possibility of them not opening or closing. Making them pneumatic resolves many of these issues. Of course one reason for not using shutters is to save cost. Most Chinese printers and low-cost UV printers made in the US and elsewhere may skip shutters.

172. What other fans are there in the printer, or exhaust ports?

There are two fans below the purging service area (back right).

COLOR MANAGEMENT FEATURES

173. What color management sensors or measuring tools are on-board?

ColorSpan has color management tools built into its UV printers, but otherwise this feature is not yet available on other brands.

ADVERTISING CLAIMS:

174. Do certain parts of the printer need to be repaired or accessed so often that you have to remove safety plates or protective plates to make access easier?

This is mainly with Chinese-made printers.

175. How often do people return this printer and say they want their money back?

This is mainly with Chinese-made printers. But, any time you are seriously thinking of any printer it is essential to learn what the recall or return rate is. In other words: how many printshops return this printer because it is either not what they expected or not what they need.

This does not automatically mean that the printer is bad; it may mean that the printshop had an unrealistic expectation. Sometimes the printshop did not anticipate how much maintenance and care the printer needed in the evening and in the morning.

It is likely that every single brand out there has printers they have had to take back. But you ought to learn how many, and why.

If the manufacturer, distributor or reseller is honest and gives you the actual facts, this is a company to trust.

If they say there have been no returns, this is statistically unlikely.

COMPARISONS WITH OTHER PRINTERS

176. When people are considering buying this printer, what other printer(s) are they also looking at?

Buyers would also perhaps be looking at HP ColorSpan, GCC StellarJet, IP&I Cube, the other Dilli (Neo Plus), and at the Agfa versions (:Anapurna X, XL, and XL2).

177. What features on the other printers may be issues?

The Keundo UV printer is a retrofitted solvent printer rather than being made from the ground up as a UV printer. The result is that rigid material has to be fed all the way out to reach the pinch rollers, so a lot is wasted before printing can begin.

The GRAPO Octopus has severe problems with overheating and with a transport belt that is not stable. End-users report that skew is a definite problem.

The Dilli Neo Plus has Spectra Nova printheads with a large picoliter drop size. The Dilli Neo Venus has Spectra Galaxy printheads with a smaller drop size so text is better defined, and in general print quality is better.

SUMMARY: Image Quality Issues: General

178. Do you need “Pantone markers” to do touch-ups?

If you use Pantone markers or other markers for touch-ups you run the risk that these areas will fade faster than the original UV ink.

Conclusions

Pros

Dilli has a research department that was apparently funded by the Korean government. D.G.I., their sibling company, also has a sophisticated research institute. The equipment for testing printer components in their two research institutes was more impressive than what I have seen in most other UV-curable inkjet printer factories in other countries.

Dilli is one of the few manufacturers that actually provide a ventilation hose and connector attachment band.

This (and the Neo Plus) are among the few printers that offer a set of two sturdy lifting hooks (so that you can lift the entire printer with a crane).

Dilli is large enough to be an international company but not so large as to lose sight of their customers. They are agile enough to accept feedback (constructive critique) and to develop work-arounds and improved solutions if issues are brought to their attention.

Downsides

No UV printer is perfect, not even the ones from companies that work hard to produce a solid product. As soon as it is possible to inspect printshops where the Dilli Neo Venus is installed we will report back on what glitches and issues are noted by the printer operator and by the owners of the printshop.

Comments & Suggestions

By coincidence last year it was possible to run into two managers of companies in the US and Europe that compete with Korean manufacturers. It was possible to spend several hours speaking with them about Korean manufacturing philosophy: one of the Ford Motor company managers was in the seat next to me on a long flight. The other Ford (Europe) manager is the husband of Andrea David, who was a FLAAR manager for many years while FLAAR had an office in Europe.

Both Ford managers, completely independently of the other, told me exactly the same: “customers who buy cars don’t recognize the high quality of Korean-made products. Customers think that Korean cars are like Chinese cars: low quality. We at Ford know this conception is totally wrong; Ford recognizes the high quality of Korean cars, and we are very fortunate that consumers have not yet realized how good Korean cars really are.”

It’s the same with Korean printers. I have now visited the factories of two Korean UV printer manufacturers and have inspected the printers of two additional Korean UV companies, Plus a colleague has visited the factories of the two companies that I have not visited: so I have notes on all four of the leading Korean printer manufacturers.

Plus I have visited the headquarters of another Korean printer manufacturer: of textile printers (Yuhan-Kimberly). Frankly their textile ink is the best I have seen anywhere in the world.

In other words: Korean manufacturing quality has nothing to do with Chinese low-bid philosophy. Koreans know they can't compete by selling low-bid machines with components so cheap that they fall apart.

Why do we spend this time researching which UV-cured wide format inkjet printers are good?

FLAAR has been asked by two different museums to help them do their interior decoration. Much of this decoration will be accomplished with inkjet printers. This is why FLAAR dedicates so much time and effort researching which UV printers are good: we are checking out which printers we might be interested in using for doing high quality printing for our own projects in the future.

Once we do all this research, we publish our results so we can help other people (so they don't have to spend the months that it took us to learn about each printer).

This is the expected work of a non-profit research institute: to share its findings with the general public.

If you need more information
about Dilli, please contact:

K.H. Park

oversales@dilli.co.kr

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As soon as you have your UV-flatbed printer, your printshop will desire to have a cutter or trimmer.

First you need to trim. Simple cutting of the edges of your board so the edges are neat and clean. Then of course some clients will ask if you can do contour-cutting. This means you can offer additional services and earn additional income.

The best way to learn about trimmers is to ask a distributor who has more than one brand. This way they do not push their house brand and denigrate brands that they do not carry. Also, you want a real person that actually has experience. Otherwise you get a "box pusher" who is simply an Internet sales person, who does not know trimmer from dimmer.

The person we suggest is **Mike Lind** because his company, **Reprographic Designs**, handles all leading brands: KeenCut, Neolt, Meteor Metoschnitt, RotaTrim, etc. You can contact him at 1 281 492 2714 or malind@msn.com.

His company is also the Master Distributor for Cruse reprographic scanners in the US and adjacent countries.



XY Cutter Options

In a period of economic recession printshops will tend to ask about options that are priced lower than high-end prices. Thus we suggest a possible solution at mid-range price: Gerber M class cutters. I have inspected two huge factory complexes of Gerber Scientific in 2008 (especially their cutters for fabrics) and will be visiting their facilities again in 2009.

To contact Gerber:

Phone (US): 800-222-7446, email: cservice@gspinc.com

Fax: 800-227-6228 or 860-648-8064

Phone (Intl): 860-648-8028, email: gspinternational@gspinc.com

We have seen Gerber cutters at work during major trade shows, both in Europe and in the US. Gerber has dealers all across the US and Canada, and in Europe is served by Spandex.

When you acquire a UV-curable wide-format printer you will eventually learn that an XY flatbed cutter is a useful accessory for thick rigid materials. The advantage of having an XY cutter is that you are selling not just the print, but a finished work. To stay ahead of the competing printshops in your city it helps to offer your clients a solution for every step of the printing workflow.



Dr. Hellmuth shows a sample processed by the Gerber M Series cutter exhibited at GraphExpo '08.



Gerber M Series cutter at ISA '08.



Complete Workflow for wide-format inkjet printing

Once you have a UV-curable flatbed, hybrid, combo, or roll-to-roll printer, there are several other components of the workflow that you need:

- RIP software
- an understanding of color management and ICC color profiles
- and an awareness of when and whether you need lamination or top coating

Every printer manufacturer will tend to say that the output with their inks do not require lamination....

- But what about floor graphics ?
- What about vehicle wrap ?

And what about covering over cure-banding and banding from feeding inaccuracy ?

- What about the fact that 75% of UV-cured printers can't produce gloss and some not even satin surface appearance?



Hmmm,
So now you know why FLAAR is evaluating liquid top-coating equipment and studying film laminators and liquid laminators. Indeed one of the several new staff that we hired is an experienced printshop operator with practice on VUTEk solvent printers and Seal brand liquid laminators.

Our first major research project is on the UV-cured liquid top coating system of Drytac. We found a printshop that had bought the #1 leading brand of coater, found that it did not

work to his expectations. So he looked around at several trade shows and then bought a Drytac UV coater.



Here is the printer and coater operator, Jacob Duquenne. Notice that FLAAR actually makes printshop inspections and actually checks out how the equipment performs.

The print shop is a 6-hour round trip drive from the FLAAR office in St Louis, so it was relatively easy to reach. You can also download the FLAAR Reports on the other equipment at this printshop: Seiko ColorPainter H-104s.

And, while we were preparing the Seiko evaluation, we decided to issue a complete glossary on solvent printers: eco-, mild-, lite-, and bio-solvent.

FLAAR sent Dr Nicholas Hellmuth and one Technical Writer to inspect the liquid coating system, spending two days at the printshop in Illinois. The FLAAR Report is now coming out this week or next week.

So whether you print giclee, or décor, or signage of all sizes, shapes, and materials, you can now look forward to the FLAAR Reports bringing you innovative reports on more than just printers.

If you need information now (since the FLAAR Report will take another week or so to finish) you can contact Drytac for spec sheets and information on applications: toll free (USA) **1-800-975-6336**, Toll free Canada: **1-800-353-2883**

If from elsewhere in the world, write info@drytac.com

To see the FLAAR video on our inspection for the evaluation, [click here](#)



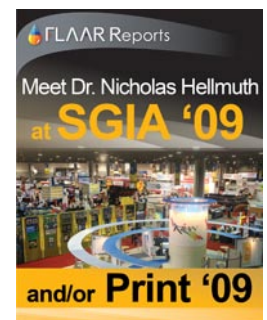
Here is Nicholas interviewing the owner of the coater. Previously he had bought the biggest name brand, but their UV coater did not function adequately and he asked them to take it back. Then he spent time checking out every single other brand: he selected the one you see here.

What's next at FLAAR ?

Our report on Caldera RIP is being updated. We are receiving more training on the HP latex ink printers, since more people are writing asking FLAAR about this ink than we anticipated. FLAAR was initially trained on HP latex ink first in Israel and then at the world headquarters of Hewlett-Packard wide-format printers in Barcelona (all before the printer was even released to the public or shown at any trade show).

To meet Nicholas and ask questions directly, you can attend his lecture at Sign Africa in Johannesburg in early September or at Print '09 in Chicago (Sept. 14th). Or you can make a reservation for consulting with him at SGIA in New Orleans.

If you are in Europe, you can make a reservation for consulting with Dr Hellmuth at VISCOM Madrid, VISCOM Dusseldorf or VISCOM Milano.



[click here](#)

Enjoy visiting other FLAAR network web sites

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Digital Photography

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Reality Check

Being a university professor for many years does not mean we know everything. But intellectual curiosity often leads us to enter areas that are new to us. So we do not shirk from entering areas where we are obviously not yet expert. If in your years of wide format printing experience have encountered results different than ours, please let us know at ReaderService@FLAAR.org. We do not mind eating crow, though so far it is primarily a different philosophy we practice, because since we are not dependent on sales commissions we can openly list the glitches and defects of those printers that have an occasional problem.

FLAAR and most universities have corporate sponsors but FLAAR web sites do not accept advertising, so we don't have to kowtow to resellers or manufacturers. We respect their experience and opinion, but we prefer to utilize our own common sense, our in-house experiences, the results from site-visit case studies, and comments from the more than 53,000 of our many readers who have shared their experiences with us via e-mail (the Survey Forms).

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Update Policy

Starting in 2008, updates on UV-curable wide-format inkjet printers are available for all individuals and companies which have a subscription, or to companies who are research project sponsors. If you are a Subscriber or manager in a company that is a research sponsor, you can obtain the next update by writing ReaderService@FLAAR.org. If you are neither a Subscriber or a research sponsor, simply order the newest version via the e-commerce system on www.wide-format-printers.NET. Please realize that because we have so many publications and many are updated so frequently that we have no realistic way to notify any reader of when just one particular report is actually updated.

There is a free PDF that describes the UV-curable inkjet printer Subscription system. Subscriptions are available only for UV-related wide-format printer publications.

FLAAR Reports on UV-curable roll-to-roll, flatbed, hybrid, and combo printers are updated when new information is available. We tend to update the reports on new printers, on printers that readers ask about the most, and on printers where access is facilitated (such as factory visits, demo-room visits, etc).

Reports on obsolete printers, discontinued printers, or printers that not enough people ask about, tend not to be updated.

FLAAR still publishes individual reports on solvent printers, and on giclee printers, but subscriptions on these are not yet available; these FLAAR Reports on solvent, eco-solvent, and water-based wide format printers have to be purchased one by one.

Please Note

This report has not been licensed to any printer manufacturer, distributor, dealer, sales rep, RIP company, media, or ink company to distribute. So, **if you obtained this from any company, you have a pirated copy.**

If you have received a translation, this translation is not authorized unless posted on a FLAAR web site, and may be in violation of copyright (plus if we have not approved the translation it may make claims that were not our intention).

Also, since this report is frequently updated, if you got your version from somewhere else, it may be an obsolete edition. FLAAR reports are being updated all year long, and our comment on that product may have been revised positively or negatively as we learned more about the product from end users.

If you receive any FLAAR Report from a sales rep, in addition to being violation of copyright, it is useful to know if there is a more recent version on the FLAAR web site, because every month new UV printers are being launched. So what was good technology one month, may be replaced by a much better printer elsewhere the next month.

To obtain a legitimate copy, which you know is the complete report with nothing erased or changed, and hence a report with all the original description of pros and cons, please obtain your original and full report straight from www.FLAAR.org.

Your only assurance that you have a complete and authentic evaluation which describes all aspects of the product under consideration, benefits as well as deficiencies, is to obtain these reports directly from FLAAR, via www.wide-format-printers.NET.

Citing and Crediting

A license from FLAAR is required to use any material whatsoever from our reports in any commercial advertisement or PR Release.

If you intend to quote any portion of a FLAAR review in a PowerPoint presentation, if this is in reference to any product that your company sells or promotes, then it would be appropriate to ask us first. FLAAR reports are being updated every month sometimes, and our comment on that product may have been revised as we learned more about the product from end users. Also, we noticed that one company cited the single favorable comment we made on one nice aspect of their printer, but neglected to cite the rest of the review which pointed out the features of the printer which did not do so well. For them to correct this error after the fact is rather embarrassing. So it is safer to ask-before-you-quote a FLAAR review on your product.

The material in this report is not only copyright, it is also based on years of research. Therefore if you cite or quote a pertinent section, please provide a proper credit, which would be minimally "Nicholas Hellmuth, year, www.FLAAR.org." If the quote is more than a few

words then academic tradition would expect that a footnote or entry in your bibliography would reference the complete title. Publisher would be www.FLAAR.org.

If you intend to quote any portion of a FLAAR review in a PowerPoint presentation, if this is in reference to any product that your company sells or promotes, then it would be appropriate to license the report or otherwise notify us in advance. FLAAR reports are being updated every week sometimes, and our comment on that product may have been revised as we learned more about the product from end users. Also, we noticed that one company cited the single favorable comment we made on one nice aspect of their printer, but neglected to cite the rest of the review which pointed out the features of the printer which did not do so well. For them to correct this error after the fact is rather embarrassing. So it is safer to ask-before-you-quote a FLAAR review on your product.

Legal notice

Inclusion in this study by itself in no way endorses any printer, media, ink, RIP or other digital imaging hardware or software. Equally, exclusion from this study in no way is intended to discredit any printer.

Advisory

We do our best to obtain information which we consider reliable. But with hundreds of makes and models of printers, and sometimes when information about them is sparse, or conflicting, we can only work with what we have available. Thus you should be sure to rely also on your own research, especially asking around. Find another trustworthy end-user of the same make and model you need to know about. Do not make a decision solely on the basis of a FLAAR report because your situation may be totally different than ours. Or we may not have known about, and hence not written about, one aspect or another which is crucial before you reach your decision.

The sources and resources we may list are those we happen to have read. There may be other web pages or resources that we missed. For those pages we do list, we have no realistic way to verify the veracity of all their content. Use your own common sense plus a grain of salt for those pages which are really just PR releases or outright ads.

We are quite content with the majority of the specific printers, RIPs, media, and inks we have in the FLAAR facilities. We would obviously never ask for hardware, software, or consumables that we knew in advance would not be good. However even for us, a product which looks good at a trade show, sounds good in the ad literature, and works fine for the first few weeks, may subsequently turn out to be a lemon.

Or the product may indeed have a glitch but one that is so benign for us, or maybe we have long ago gotten used to it and have a work-around. And not all glitches manifest themselves in all situations, so our evaluator may not have been sufficiently affected that he or she made an issue of any particular situation. Yet such a glitch that we don't emphasize may turn out to be adverse for your different or special application needs.

Equally often, what at first might be blamed on a bad product, often turns out to be a need of more operator experience and training. More often than not, after learning more about the product it becomes possible to produce what it was intended to produce. For this reason it is crucial for the FLAAR team and their university colleagues to interact

with the manufacturer's training center and technicians, so we know more about a hardware or software. Our evaluations go through a process of acquiring documentation from a wide range of resources and these naturally include the manufacturer itself. Obviously we take their viewpoints with a grain of salt but often we learn tips that are worthy of being passed along.

FLAAR has no way of testing 400+ specifications of any printer, much less the over 101 different UV printers from more than 46 manufacturers. Same with hundreds of solvent printers and dozens of water-based printers. We observe as best we can, but we cannot take each printer apart to inspect each feature. And for UV printers, these are too expensive to move into our own facilities for long-range testing, so we do as best as is possible under the circumstances. And when a deficiency does become apparent, usually from word-of-mouth or from an end-user, it may take time to get this written up and issued in a new release.

Another reason why it is essential for you to ask other printshop owners and printer operators about how Brand X and Y function in the real world is that issues may exist but it may take months for these issues to be well enough known for us to know the details. Although often we know of the issues early, and work to get this information into the PDFs, access to information varies depending on brand and model. Plus with over 300 publications, the waiting time to update a specific report may be several months. Plus, once a printer is considered obsolete, it is not realistic to update it due to the costs involved.

For these reasons, every FLAAR Report tries to have its publication date on the front outside cover (if we updated everything instantly the cost would be at commercial rates and it would not be possible to cover these expenses). At the end of most FLAAR Reports there is additionally a list of how many times that report has been updated. A report with lots of updates means that we are updating that subject based on availability of new information. If there is no update that is a pretty good indication that report has not been updated! With 101 models of UV printers, several hundred solvent printers, and scores of water-based printers, we tend to give priority to getting new reports out on printers about which not much info at all is available elsewhere. So we are pretty good about reporting on advances in LED curing. But glitches in a common water-based printer will take longer to work its way through our system into an update, especially if the glitch occurs only in certain circumstances, for example, on one type of media. With several hundred media types, we may not yet have utilized the problem media. While on the subject of doing your own research, be sure to ask both the printer operator and printshop owner or manager: you will generally get two slightly different stories. A printer operator may be aware of more glitches of the printer than the owner.

If a printer is no longer a prime model then there is less interest in that printer, so unless a special budget were available to update old reports, it is not realistic to update old reports. As always, it is essential for you to visit printshops that have the printers on your short-list and see how they function in the real world.

But even when we like a product and recommend it, we still can't guarantee or certify any make or model nor its profitability in use because we don't know the conditions under which a printer system might be utilized in someone else's facility. For ink and media, especially after-market third-party ink and media, it is essential that you test it first, under your conditions. We have no way to assure that any ink or media will be acceptable for your specific needs in your specific print shop. As a result, products are described "as is" and without warranties as to performance or merchantability, or of fitness

for a particular purpose. Any such statements in our reports or on our web sites or in discussions do not constitute warranties and shall not be relied on by the buyer in deciding whether to purchase and/or use products we discuss because of the diversity of conditions, materials and/or equipment under which these products may be used. Thus please recognize that no warranty of fitness or profitability for a particular purpose is offered.

The user is advised to test products thoroughly before relying on them. We do not have any special means of analyzing chemical contents or flammability of inks, media, or laminates, nor how these need to be controlled by local laws in your community. There may well be hazardous chemicals, or outgassing that we are not aware of. Be aware that some inks have severe health hazards associated with them. Some are hazardous to breathe; others are hazardous if you get them on your skin. For example, some chemicals such as cyclohexanone do not sound like chemicals you want to breathe every day. Be sure to obtain, read, and understand the MSDS sheets for the inks, media, and laminates that you intend to use. Both solvent, eco-solvent, and UV-curable inks are substances whose full range of health and environmental hazards are not yet fully revealed. It is essential you use common sense and in general be realistic about the hazards involved, especially those which are not listed or which have not yet been described. FLAAR is not able to list all hazards since we are not necessarily aware of the chemical components of the products we discuss. Our reports are on usability, not on health hazards.

Most inks are clearly not intended to be consumed. Obviously these tend to be solvent inks and UV-curable inks. Yet other inks are edible, seriously, they are printed on birthday cakes. Indeed Sensient is a leader in a new era of edible inks. Therefore the user must assume the entire risk of ascertaining information on the chemical contents and flammability regulations relative to inks, media or laminates as well as using any described hardware, software, accessory, service, technique or products.

We have no idea of your client's expectations. What students on our campus will accept may not be the same as your Fortune 500 clients. In many cases we have not ourselves used the products but are basing our discussion on having seen them at a trade show, during visiting a print shop, or having been informed about a product via e-mail or other communication.

Results you see at trade shows may not be realistic

Be aware that trade show results may not be realistic. Trade shows are idealized situations, with full-time tech support to keep things running. The images at a trade show may be tweaked. Other images may be "faked" in the sense of slyly putting on primer without telling the people who inspect the prints. Most UV inks don't stick to all materials; many materials need to be treated.

Or the UV prints may be top-coated so that you can't do a realistic scratch test.

Booth personnel have many standard tricks that they use to make their output look gorgeous. In about half the cases you will not likely obtain these results in real life: in most cases they are printing uni-directional, which may be twice as slow as bi-directional.

Trade show examples tend to be on the absolutely best media. When you attempt to save money and use economy media you will quickly notice that you do not get anywhere near the same results as you saw in the manufacturer's trade show booth, or pictured in their glossy advertisement. Five years ago we noticed Epson was laminat-

ing prints to show glossy output because their pigmented inks could not print on actual glossy media. The same equipment, inks, media, and software may not work as well in your facility as we, or you, see it at a trade show. All the more reason to test before you buy; and keep testing before you make your final payment. Your ultimate protection is to use a gold American Express credit card so you can have leverage when you ask for your money back if the product fails.

Images printed at trade show may be in uni-directional mode: so you may not realize the printer has bi-directional (curing) banding defects until you unpack it in your printshop. Bi-directional curing banding is also known as the lawnmower effect. Many printers have this defect; sometimes certain modes can get rid of it, but are so slow that they are not productive.

You absolutely need to do print samples with your own images and the kind provided by your clients. Do not rely on the stock photos provided by the printer, ink, media, or RIP manufacturer or reseller. They may be using special images which they know in advance will look fabulous on their printer. Equally well, if you send your sample images to the dealer, don't be surprised if they come back looking awful. That is because many dealers won't make a serious effort to tweak their machine for your kind of image. They may use fast speed just to get the job done (this will result in low quality). Check with other people in your area, or in the same kind of print business that you do. Don't rely on references from the reseller or manufacturer (you will get their pet locations which may be unrealistically gushy): find someone on your own.

Factors influencing output

Heat, humidity, static, dust, experience level of your workers (whether they are new or have prior years experience): these are all factors that will differ in your place of business as compared with test results or demo room results.

Actually you may have people with even more experience than we do, since we deliberately use students to approximate newbies. FLAAR is devoted to assisting newcomers learn about digital imaging hardware and software. This is why Nicholas Hellmuth is considered the "Johnny Appleseed" of wide format inkjet printers.

Therefore this report does not warranty any product for any quality, performance or fitness for any specific task, since we do not know the situation in which you intend to use the hardware or software. Nor is there any warranty or guarantee that the output of these products will produce salable goods, since we do not know what kind of ink or media you intend to use, nor the needs of your clients. A further reason that no one can realistically speak for all aspects of any one hardware or software is that each of these products may require additional hardware or software to reach its full potential.

For example, you will most likely need a color management system which implies color measurement tools and software. To handle ICC color profiles, you may need ICC color profile generation software and a spectrophotometer since often the stock pre-packaged ICC color profiles which come with the ink, media, printers and/or RIPs may not work in your situation. Not all RIPs handle color management equally, or may work better for some printer-ink-media combinations than for others.

Be aware that some RIPs can only accept ICC color profiles: you quickly find out the hard way that you can't tweak these profiles nor generate new ones. So be sure to get a RIP which can handle all aspects of color management. Many RIPs come in different levels.

You may buy one level and be disappointed that the RIP won't do everything. That's because those features you may be lacking are available only in the next level higher of that RIP, often at considerable extra cost. Same thing in the progression of Chevy through Pontiac to Cadillac, or the new Suburbans. A Chevy Suburban simply does not have all the bells and whistles of the Cadillac Escalade version of this SUV.

Don't blame us... besides, that's why we are warning you. This is why we have a Survey Form, so we can learn when you find products that are inadequate. We let the manufacturers know when end users complain about their products so that the manufacturers can resolve the situation when they next redesign the system.

Most newer printer models tend to overcome deficiencies of earlier models. It is possible that our comparative comments point out a glitch in a particular printer that has been taken care of through an improvement in firmware or even an entirely new printer model. So if we point out a deficiency in a particular printer brand, the model you may buy may not exhibit this headache, or your kind of printing may not trigger the problem. Or you may find a work-around.

Just remember that every machine has quirks, even the ones we like. It is possible that the particular kind of images, resolution, inks, media, or other factors in your facility are sufficiently different than in ours that a printer which works just fine for us may be totally unsatisfactory for you and your clients. However it may be that the specific kind of printing you need to do may never occasion that shortcoming. Or, it may be that your printer was manufactured on a Monday and has defects that are atypical, show up more in the kind of media you use which we may not use as often or at all during our evaluations. Equally possibly a printer that was a disaster for someone else may work flawlessly for you and be a real money maker for your company.

So if we inspect a printer in a printshop (a site-visit case study), and that owner/operator is content with their printer and we mention this; don't expect that you will automatically get the same results in your own printshop.

In some cases a product may work better on a Macintosh than on a PC. RIP software may function well with one operating system yet have bugs and crash on the same platform but with a different operating system. Thus be sure to test a printer under your own specific work conditions before you buy.

And if a printer, RIP, media, or ink does not function, return it with no ands, ifs or buts. Your best defense is to show an advertising claim that the printer simply can't achieve. Such advertising claims are in violation of federal regulations, and the printer companies know they are liable for misleading the public.

But before you make a federal case, just be sure that many of the issues are not user error or unfamiliarity. It may be that training or an additional accessory can make the printer do what you need it to accomplish. Of course if the printer ads did not warn you that you had to purchase the additional pricey accessory, that is a whole other issue. Our reviews do not cover accessories since they are endless, as is the range of training, or lack thereof, among users.

The major causes of printer breakdown and failure is lack of maintenance, poor maintenance, spotty maintenance, or trying to jerry-rig some part of the printer. The equally common cause of printer breakdown is improper use, generally due from lack of training or experience. Another factor is whether you utilize your printer all day

every day. Most solvent and UV printers work best if used frequently. If you are not going to use your printer for two or three days, you have to put flush into the system and prepare it for hibernation (even if for only four or five days). Then you have to flush the ink system all over again.

Also realize that the surface of inkjet prints are fragile and generally require lamination to survive much usage. Lamination comes in many kinds, and it is worth finding a reliable lamination company and receiving training on their products.

Also realize that no hybrid or combo UV printer can feed all kinds of rigid materials precisely. Some materials feed well; others feed poorly; others will skew.

Although we have found several makes and models to work very well in our facilities, how well they work in your facilities may also depend on your local dealer. Some dealers are excellent; others just sell you a box and can't provide much service after the sale. Indeed some low-bid internet sales sources may have no technical backup whatsoever. If you pay low-bid price, you can't realistically expect special maintenance services or tech support later on from any other dealer (they will tell you to return to where you paid for the product). This is why we make an effort to find out which dealers are recommendable. Obviously there are many other dealers who are also good, but we do not always know them. To protect yourself further, always pay with a level of credit card which allows you to refuse payment if you have end up with a lemon. A Gold American Express card allows you to refuse payment even months after the sale. This card may also extend your warranty agreement in some cases (check first).

Most of the readers of the FLAAR Reports look to see what printers we use in our own facilities. Readers realize that we will have selected the printers that we like based on years of experience and research. Indeed we have met people at trade shows who told us they use the FLAAR web site reports as the shopping list for their corporate purchases.

Yes, it is rather self-evident that we would never ask a manufacturer to send a product which we knew in advance from our studies was no good. But there are a few other printers which are great but we simply do not have them in our facilities yet.

So if a printer is not made available by its manufacturer, then there is no way we can afford to have all these makes and models in our facility. Thus to learn about models which we do not feature, be sure to ask around in other print shops, with IT people in other corporations, at your local university or community college. Go to trade shows.... but don't use only the booth....ask questions of people in the elevator, in line at the restaurant, anywhere to escape the smothering hype you get in the booth.

Realize that a FLAAR Report on a printer is not by itself a recommendation of that printer. In your local temperature, in your local humidity, with the dust that is in your local air, with your local operator, and with disorientation of the insides of a printer during rough shipment and installation, we have no knowledge of what conditions you will face in your own printshop. We tend to inspect a printer first in the manufacturing plant demo room: no disjointed parts from any shipment since this printer has not been lifted by cranes and run over a rough pot-holed highway or kept in smeltering heat or freezing cold during shipment.

Taking into consideration we do not know the conditions in which you may be using your hardware, software, or consumables, neither

the author nor FLAAR nor either university is liable for liability, loss or damage caused either directly or indirectly by the suggestions in this report nor by hardware, software, or techniques described herein because.

Availability of spare parts may be a significant issue

Chinese printers tend to switch suppliers for spare parts every month or so. So getting spare parts for a Chinese printer will be a challenge even if the distributor or manufacturer actually respond to your e-mails at all. Fortunately some companies to have a fair record of response; Teckwin is one (based on a case of two problematical hybrid UV printers in Guatemala). The distributor said that Teckwin sent a second printer at their own expense and sent tech support personnel at their expense also. But unfortunately both the hybrid UV printers are still abandoned in the warehouse of the distributor; they were still there in January 2009. But Teckwin has the highest rating of any Chinese company for interest in quality control and realization that it is not good PR to abandon a client or reseller or distributor all together.

Recently we have heard many reports of issues of getting parts from manufacturers in other countries (not Asia). So just because you printer is made in an industrialized country, if you are in the US and the manufacturer is X-thousand kilometers or miles away, the wait may be many days, or weeks.

Lack of Tech Support Personnel is increasing

The book of sales in the third quarter of 2008 resulted in many tech support problems.

The recession resulted in even more: some manufacturers may need to skimp on quality control during a recession, or switch to cheaper parts suppliers. Plus they are not hiring enough tech support during a recession. So the bigger and more successful the company, in some cases the worse these particular problems may be.

Any new compiled printer may take a few months to break in

Any new printer, no matter who the manufacturer, or how good is the engineering and electronics, will tend to have teething issues. Until the firmware is updated, you may be a beta tester. This does not mean the printer should be avoided, just realize that you may have some downtime and a few headaches. Of course the worst case scenario for this was the half-million dollar Lüscher JetPrint: so being "Made in Switzerland" was not much help.

Counterfeit parts are a problem with many printers made in China

Several years ago many UV printers made in China and some made elsewhere in Asia had counterfeit parts. No evaluation has the funding available to check parts inside any printer to see if they are from the European, Japanese, or American manufacturer, or if they are a clever counterfeits.

Be realistic and aware that not all materials can be printed on equally well

Many materials don't feed well through hybrid (pinch roller on grit roller systems) or combo UV systems (with transport belts). Banding, both from poor feeding, and from bi-directional (lawnmower effect) are common on many UV-curable inkjet printers.

It is typical for some enthusiastic vendors to claim verbally that their printer can print on anything and everything. But once you unpack

the printer and set it up, you find that it requires primer on some materials; on other materials it adheres for a few weeks but then falls off.

And on most hybrid and many combo printers, some heavy, thick, or smooth-surfaced materials skew badly. Since the claim that the printer will print on everything is usually verbal, it is tough to prove this aspect of misleading advertising to a jury.

Not all inks can print on all materials. And at a trade show, many of the materials you see so nicely printed on, the manufacturer may be adding a primer at night or early in the morning: before you see the machine printing on this material.

We feel that the pros and cons of each product speak more than adequately for themselves. Just position the ad claims on the left: put the actual performance results on the right. The unscrupulous hype for some printers is fairly evident rather quickly.

Be sure to check all FLAAR resources

Please realize that with over 200 different FLAAR Reports on UV printers, you need to be sure to check the more obscure ones too. If a printer has a printhead issue, the nitty gritty of this may be in the FLAAR Report on printheads. The report on the model is a general introduction; if we discussed the intimate details of printheads then some readers might fall asleep. And obviously do not limit yourself to the free reports. The technical details may be in the reports that have a price to them. Our readers have said they prefer to have the general basics, and to park the real technical material in other reports that people can buy if they really want that level of information.

So it may be best to ask for personal consulting. The details of the problems with the ColorSpan 5400uv series are rather complex: namely the center row of the Ricoh printheads. This would require an expensive graphic designer and consultants to show the details. And the design of the printhead would probably be altered by the time we did any of this anyway. So it is essential to talk with people: with other end-users, and with FLAAR in person on a consulting basis.

Acknowledgements

With 12 employees the funding has to come from somewhere, so we do welcome project sponsorship, research grants, contributions that facilitate our educational programs, scholarships for co-op interns and graduate students, and comparable project-oriented funding from manufacturers. The benefit for the end-user is a principle called academic freedom, in this case,

- The freedom of a professor or student to speak out relative to the pros and cons of any equipment brought to them to benchmark.
- The freedom to design the research project without outside meddling from the manufacturer.

Fortunately, our budget is lean and cost effective as you would expect for a non-profit research institute. As long as we are not desperate for money we can avoid the temptation to accept payment for reprinting corporate PR hype. So the funding is used for practical research. We do not accept (nor believe) and certainly do not regurgitate corporate PR. For example, how many manufacturer's PR photos of their products have you seen in our reports or on our web sites?

Besides, it does not take any money to see which printers and RIPs function as advertised and which don't. We saw one hyped printer grind to a halt, malfunction, or otherwise publicly display its incapacities at several trade shows in a row. At each of those same trade

shows another brand had over 30 of their printers in booths in virtually every hall, each one producing museum quality exhibits. Not our fault when we report what we see over and over and over again. One of our readers wrote us recently, "Nicholas, last month you recommended the as one of several possible printers for our needs; we bought this. It was the best capital expenditure we have made in the last several years. Just wanted to tell you how much we appreciate your evaluations...."

FLAAR is a non-profit educational and research organization dedicated for over 36 years to professional photography in the arts, tropical flora and fauna, architectural history, and landscape panorama photography.

Our digital imaging phase is a result of substantial funding in 1996 from the Japanese Ministry of Public Education for a study of scanning and digital image storage options. This grant was via Japan's National Museum of Ethnology, Osaka, Japan. That same year FLAAR also received a grant of \$100,000 from an American foundation to do a feasibility study of digital imaging in general and the scanning of photographic archives in particular.

The FLAAR web sites began initially as the report on the results of these studies of scanners. Once we had the digital images we began to experiment with digital printers. People began to comment that our reports were unique and very helpful. So by 1999 we had entire sections on large format printers.

FLAAR has existed since 1969, long before inkjet printers existed. Indeed we were writing about digital imaging before HP even had a color inkjet system available. In 2000 FLAAR received an educational grant from Hewlett-Packard large format division, Barcelona, Spain, for training, for equipment, and to improve the design and navigation on the main web sites of the FLAAR Network. This grant ran its natural course, and like all grants, reached its finishing point, in this case late 2005.

In some cases the sponsorship process begins when we hear end-users talking about a product they have found to be better than other brands. We keep our ears open, and when we spot an especially good product, this is the company we seek sponsorship from. It would not be wise of us to seek sponsorship from a company with a sub-standard or otherwise potentially defective printer. So we usually know which printers are considered by end-users to be among the better brands before we seek sponsorship. After all, out of the by now one million readers, we have heard plenty about every single printer out there.

We thank MacDermid ColorSpan (now part of HP), Hewlett-Packard, Parrot Digigraphic, Color DNA, Canon, Gandinnovations, and other companies for providing funding for technology training for the FLAAR staff and our colleagues at Bowling Green State University in past years and for funds to allow us to attend all major international trade shows, which are ideal locations for us to gather information. We thank Sun LLC, Caldera, Raster Printers (EFI Rastek), DEC LexJet, DigiFab, Barbieri electronic, Seiko, Mutoh Europe, IP&I, Dilli, Yuhan-Kimberly, GCC, Grapo, Durst, and WP Digital for providing funds so that we can make more of our publications free to end-users. During 2000-2001 we had grants to cover all the costs of our publications, and all FLAAR Reports were free in those early years. As that early grant naturally expired after a few years, we had to begin charging for some of our reports to cover costs. Now (in 2009), we are seeking corporate sponsorship so we can gradually make another 20% of our publications free to our readers.

Since 2006 we do a major part of our evaluations at a factory and headquarters demo room. Since the university does not fund any of

these trips, it is traditional for the manufacturer to fund a research sponsorship. In the US this is how most university projects are initiated for decades now, and it is increasing. In fact there is a university in Austria that is not an "edu" but is a "GmbH", funded by the chamber of commerce of that part of Austria. In other words, a university as an educational institution, but functioning in the real world as an actual business. This is a sensible model.

It has been helpful when companies make it possible for us to fly to their headquarters so we can inspect their manufacturing facilities, demo rooms, and especially when the companies make their research, engineering and ink chemistry staff available for discussions. When I received my education at Harvard I was taught to have a desire to learn new things. This has guided my entire life and is what led me into wide-format digital imaging technology: it is constantly getting better and there is a lot to learn every month. Thus I actively seek access to improving my understanding of wide format printer technology so that we can better provide information to the approximately quarter-million+ readers of our solvent and UV printer web site (www.large-format-printers.org) and the over half a million who read either our wide-format-printers.org site or our roughly half million combined who read our digital-photography.org and www.FineArtGicleePrinters.org sites.

Barbieri electronic (color management), Caldera (RIP), ColorSpan, DEC, Durst, Gerber, Grapo, IP&I, Mimaki USA, Mutoh, Dilli, GCC, NUR, Oce, Shiraz (RIP), Sun, Teckwin, VUTEK, WP Digital, Xerox, Yuhan-Kimberly, Zund have each brought FLAAR staff to their headquarters and printer factories. Bordeaux, InkWin and Sunflower ink have brought us to inspect their ink manufacturing facilities and demo rooms. We have visited the world headquarters and demo rooms of HP in Barcelona and received informative and helpful technology briefings. We are under NDA as to the subjects discussed but it is important that we be open where we have visited. Mimaki Europe has had FLAAR as their guest in Europe to introduce their flatbed UV printer, as have other UV-curable manufacturers, again, under NDA as to the details since often we are present at meetings where unreleased products are discussed. Xaar has hosted an informative visit to their world headquarters in the UK. You don't get this level of access from a trade magazine writer, and I can assure you, we are provided much more detailed information and documentation in our visits than would be provided to a magazine author or editor. Companies have learned that it's a lot better to let us know up front and in advance the issues and glitches with their printers, since they now know we will find out sooner or later on our own. They actually tell us they realize we will find out on our own anyway.

Contributions, grant, sponsorships, and project funds from these companies are also used to improve the design and appearance of the web sites of the FLAAR Information Network. We thank Canon, ColorSpan, HP, ITNH, and Mimaki for providing wide format printers, inks, and media to the universities where FLAAR does research on wide format digital imaging. We thank Epson America for providing an Epson 7500 printer many years ago, and Parrot Digigraphic for providing three different models of Epson inkjet printers to our facilities on loan at BGSU (5500, 7600, 7800). We thank Mimaki USA for providing a JV4 and then a Mimaki TX-1600s textile printer and Improved Technologies (ITNH) providing their Ixia model of the Iris 3047 giclee printer.

We thank 3P Inkjet Textiles and HP for providing inkjet textiles so we could learn about the different results on the various textiles. IJ Technologies, 3P Inkjet Textiles, ColorSpan, Encad, HP, Nan Ya Pepa, Oracal, Tara and other companies have provided inkjet media so we can try it out and see how it works (or not as the case may be; several

inkjet media failed miserably, one from Taiwan, the other evidently from Germany!). We thank Aurelon, Canon, ColorGate, ColorSpan, ErgoSoft, HP, PerfectProof, PosterJet, Onyx, Ilford, CSE ColorBurst, ScanvecAmiable, Wasatch and many other RIP companies for providing their hardware and software RIPs.

We thank Dell Computers for providing awesome workstations for testing RIP software and content creation with Adobe Photoshop and other programs. We also appreciate the substantial amount of software provided by Adobe. As with other product loaned or provided courtesy of ProVar LLC (especially the 23" monitors which makes it so much easier to work on multiple documents side by side).

We thank Betterlight, Calumet Photographic, Global Graphics, Westcott, Global Imaging Inc. Phase One, and Bogen Imaging for helping to equip our archaeological photo studios at the university and its archaeology museum in Guatemala. Heidelberg, Scitex, CreoScitex (now Kodak) and Cruse, both in Germany, have kindly provided scanners for our staff to evaluate.

We really liked some of the results whereas some of the other products were a bit disappointing. Providing samples does not influence the evaluations because the evaluators are students, professors, and staff of Bowling Green State University. These personnel are not hired by any inkjet printer company; they were universities employees (as was also true for Nicholas Hellmuth). The testing person for the HP ColorPro (desktop printer) said he frankly preferred his Epson printer. When we saw the rest results we did not include this Hewlett-Packard ColorPro printer on our list of recommended printers, but we love our HP DesignJet 5000ps so much we now have two of them, one at each university.

Sometimes we hear horror stories about a printer. The only way we can tell whether this is the fault of the printer design, or lack of training of the operator, is to have the printer ourselves in-house. Of course some printer manufacturers don't understand the reasons we need to have each make and model; they are used to loaning their demo units for a week or so. That is obviously inadequate for a serious review.

Some of the media provided to us failed miserably. Three printers failed to meet common sense usability and printability standards as well (HP 1055, one older desktop model (HP Color Pro GA), and one Epson). Yet we know other users who had better results; maybe ours came down the assembly line on a Monday or Friday afternoon, when workers were not attentive. One costly color management software package was judged "incapable" by two reviewers (one from the university; second was an outside user who had made the mistake of buying this package).

So it's obvious that providing products or even a grant is no shield from having your products fail a FLAAR evaluation. The reason is clear: the end user is our judge. The entire FLAAR service program is to assist the people who need to use digital imaging hardware and software. If a product functions we find out and promulgate the good news. If a product is a failure, or more likely, needs some improvement in the next generation, we let people know. If a product is hyped by what an informed user would recognize as potentially false and misleading nonsense, then we point out the pathetic discrepancies very clearly.

This is what you should expect from an institute which is headed by a professor.

Actually, most of our reviews are based on comments by end users. We use their tips to check out pros and cons of virtually every product

we discuss. You can't fool a print shop owner whose printer simply fails to function as advertised. And equally, a sign shop owner who earns a million dollars a year from a single printer brand makes an impact on us as well. We have multiple owners of ColorSpan printers tell us that this printer is their real money earner for example. We know other print shops where their primary income is from Encad printers. Kinkos has settled on the HP 5000 as its main money maker production machine, and so on.

Yet we have documentation of several print shop companies whose business was ruined by specific brands that failed repeatedly. It is noteworthy that it is always the same brand or printer at both locations: one due to banding and printheads then simply no longer printing one color; the other brand due to pokiness of the printer simply not being competitively fast enough. Same with RIPs, we have consistent statements of people using one RIP, and only realizing how weak it was when they tried another brand which they found substantially better. Thus we note that companies which experiment with more than one brand of product tend to realize more quickly which brand is best. This is where FLAAR is in an ideal situation: we have nine RIPs and 25 printers. Hence it is logical that we have figured out which are best for our situation.

Grant funding, sponsorship, demonstration equipment, and training are supplied from all sides of the spectrum of printer equipment and software engineering companies. Thus, there is no incentive to favor one faction over another. We receive support from three manufacturers of thermal printheads (Canon, ColorSpan and HP) and also have multiple printers from three manufacturers of piezo printers (Epson, Seiko, Mutoh, and Mimaki). This is because piezo has definite advantage for some applications; thermal printheads have advantages in different applications. Our reviews have universal appeal precisely because we feature all competing printhead technologies. Every printer, RIPs, inks, or media we have reviewed have good points in addition to weaknesses. Both X-Rite and competitor GretagMacbeth provided spectrophotometers. Again, when all sides assist this program there is no incentive to favor one by trashing the other. Printer manufacturer ad campaigns are their own worst enemy. If a printer did not make false and misleading claims, then we would have nothing to fill our reviews with refuting the utter nonsense that is foisted on the buying public.

It is not our fault if some printers are more user friendly, print on more media than other brands. It is not our fault that the competing printers are ink guzzlers, are slow beyond belief, and tend to band or drop out colors all together. We don't need to be paid by the printer companies whose products work so nicely in both our universities on a daily basis. The printers which failed did so in front of our own eyes and in the print shops of people we check with. And actually we do try to find some redeeming feature in the slow, ink gulping brands: they do have a better dithering pattern; they can take thick media that absolutely won't feed through an HP. So we do work hard at finding the beneficial features even of printers are otherwise get the most critique from our readers. Over one million people will read the FLAAR Information Network in the next 12 months; 480,000 people will be exposed to our reports on wide format printers from combined total of our three sites on these themes. You can be assured that we hear plenty of comments from our readers about which printers function, and which printers fail to achieve what their advertising hype so loudly claims.

An evaluation is a professional service, and at FLAAR is based on more than 11 years of experience. An evaluation of a printer, an ink, a software, laminator, cutter or whatever part of the digital printing workflow is intended to provide feedback to all sides. The manufacturers appreciate learning from FLAAR what features of their printers

need improvement. In probably half the manufacturers FLAAR has dealt with, people inside the company did not, themselves, want to tell their boss that their pet printer was a dog. So printer, software, and component manufacturers have learned that investing in a FLAAR evaluation of their product provides them with useful return on investment. Of course if a printer manufacturer wants only a slick Success Story, or what we call a "suck up review" that simply panders to the manufacturer, obviously FLAAR is not a good place to dare to ask for such a review. In several instances it was FLAAR Reports that allowed a company to either improve their printer, or drop it and start from scratch and design a new and better one.

And naturally end-users like the opportunity to learn about various printers from a single source that covers the entire range from UV through latex through all flavors of solvent.

We have also learned that distributors often prefer to accept for distribution a printer or other product on which a FLAAR Report already exists.

We turn down offers of funding every year. These offers come from PO Box enterprises or products with no clearly visible point of manufacture. Usually the company making the offer presumes they can buy advertising space just by paying money. But that is not what our readers want, so we politely do not accept such offers of money.

Contributions, grants, sponsorships, and funding for surveys, studies and research is, however, open to a company who has an accepted standing in the industry. It is helpful if the company has a visible presence at leading trade shows and can provide references from both end users and from within the industry. Where possible we prefer to visit the company in person or at least check them out at a trade show. Obviously the product needs to have a proven track record too. Competing companies are equally encouraged to support the FLAAR system. We feel that readers deserve to have access to competing information. Competition is the cornerstone of American individualism and technological advancement.

FLAAR also covers its costs of maintaining the immense system of 8 web sites in three languages and its facilities in part by serving as a consultant such as assisting inkjet manufacturers learn more about the pros and cons of their own printers as well as how to improve their next generation of printers. It is especially useful to all concerned when manufacturers learn of trends (what applications are popular and for what reasons). For example, manufacturers need to know whether to continue designing software for Mac users, or concentrate software for PC users. So the survey form that you fill out is helpful to gather statistics. You benefit from this in two ways: first, you get the FLAAR reports in exchange for your survey form. Second, your comments bring (hopefully) change and improvement in the next generation of printers. When we do survey statistics, then the names, addresses, and telephone numbers are removed completely. A survey wants only aggregate numbers, not individuals. However, if you ask about a specific brand of printer, and do not opt out, we forward your request to a pertinent sponsor so you can obtain follow-up from that brand, since we ourselves do not have enough personnel to respond to each reader by telephone. But we do not provide your personal information to outsiders and our survey form has an opt out check-off box which we honor.

FLAAR also serves as consultants to Fortune 500 companies as well as smaller companies and individuals who seek help on which printers to consider when they need digital imaging hardware and software.

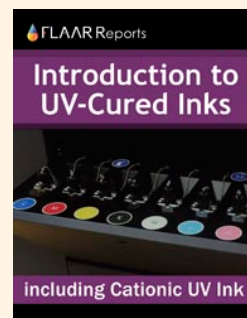
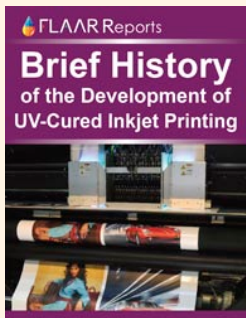
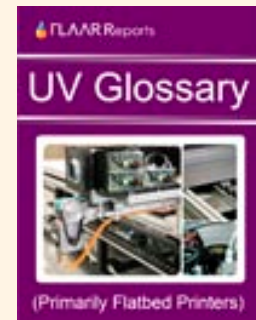
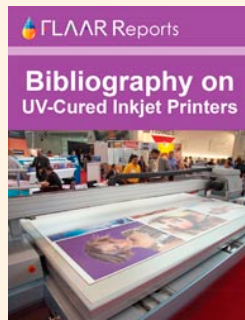
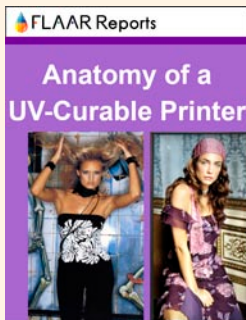
A modest portion of our income comes from our readers who purchase the FLAAR series. All income helps continue our tradition of independent evaluations and reviews of inkjet printers, RIPs, media, and inks.

These are some of the most

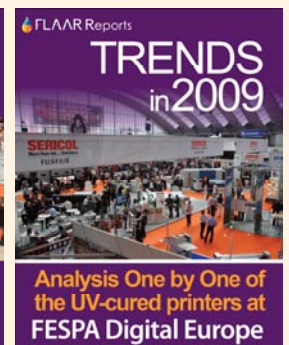
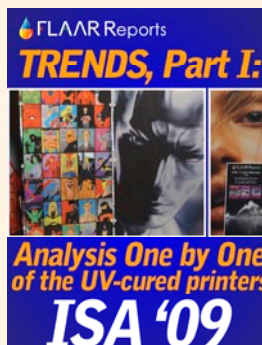
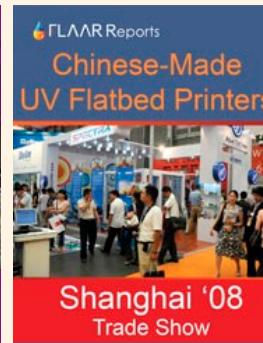
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